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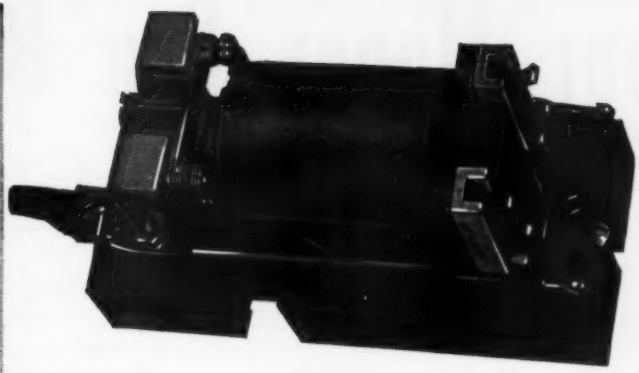

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The Journal of the Telephone Industry

FEBRUARY 23, 1946

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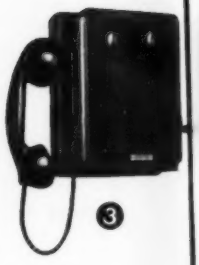

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Rural Line Service

By John D. Taylor CONSULTING ENGINEER

IN THE design of rural telephone plant, from a transmission standpoint, consideration should be given to the fact that rural service now plays an important part in the world-wide telephone network. Rural service is no longer an isolated one between farmers or with their trading centers. The business and social life of all rural communities has greatly expanded in recent years. This was particularly true during World War II, which catastrophe vitally affected every nook and corner in our country.

It is self-evident that satisfactory telephone connections, regardless of length, can only sustain a certain amount of transmission loss (loss of electrical speech energy) without becoming unintelligible and of little, if any, value. It is also obvious, therefore, that on short connections, such as between two rural stations in the same community, the transmission loss is much less than it would be on an unamplified connection between, say, Maine and California. Connections of the latter type would definitely be of no value without sufficient amplification.

Thus, to provide universal telephone service, the telephone plant, whether rural, town or toll, should be so engineered that it will function properly with any other telephone plant in the nation. In order to accomplish this, the *General Toll Switching Plan* was conceived and placed in effect a number of years ago. It is not the intent of this article to describe this plan in detail, but, in order to clarify the basis for rural plant design, it is necessary to indicate the principal points of the plan and the part rural service plays in the universal picture.

The basic foundation of the plan provides for the establishment of eight strategically located points throughout the United States, known as regional centers. These are: New York, Chicago, Denver, San Francisco, Atlanta, St. Louis, Dallas and Los Angeles. Each of these centers has direct circuits to each of the other centers. Each regional center, also, has direct connections to a large number of important cities, known as *primary outlets*, within its own area and with outlets in other areas. For example, New York serves Boston, Philadelphia, Washington, and other outlets; Chicago serves Detroit, Milwaukee, Minneapolis, and other outlets. Each primary outlet connects directly with the various *toll centers* in its area and the toll centers with the subscribers either directly or through *tributary* points. In addition, there are many interconnections between outlets and toll centers in different areas, depending on the traffic needs.

PART IV. Rural Line Transmission. The third article in this series appeared in the December 29, 1945 issue, page 22.

It is apparent, therefore, that, under the plan, normally all toll traffic has definite pre-determined routings, which arrangement makes it possible to design the nationwide telephone network, and give a satisfactory universal service. To provide this service, the *maximum permissible effective transmission loss* between any two subscribers in the land was, of necessity, established as the basis for the toll network and exchange (including rural) plant design. Part of this maximum loss was allocated to the toll and part to the exchange in accordance with the capabilities of, and the economies in, the two types of plant. This is necessary so that the service objective would be obtained most effectively and at minimum cost in the over-all national system.

The plan now provides for a maximum permissible effective loss between any two subscribers in the country of 23 decibels, a decibel being the standard unit for expressing the change in electrical speech energy or power between any two points in a telephone circuit. This maximum loss simply means that the original electrical speech energy generated by the speaker in the telephone transmitter must not be reduced in effectiveness at the receiving station receiver by more than a ratio of 200 to 1.

The maximum permissible effective loss allocated under the plan between a primary outlet and any telephone station (town or rural) within the outlet area is 10 decibels. This loss permits a maximum reduction in transmitted electrical power between the outlet and any of its stations in the ratio of 10 to 1.

Finally, the 10 decibels of permissible outlet loss should be so allocated between the toll and exchange plant within the outlet area that ultimately the most economical over-all plant is provided. However, in allocating such loss, it is necessary to provide a certain margin of loss in the outlet-toll center circuits in order that the important long haul toll circuits between regional centers and between regional centers and primary outlets may be satisfactorily operated at very low losses. Only in this manner can the objective of a satisfactory universal telephone service be accomplished.

A typical allocation of the outlet loss between the outlet-toll center circuit and the toll center-subscriber station circuit (including any tributary circuit) is nine decibels, and one decibel, respectively. The low toll center-subscriber station loss, known as the *toll terminal loss*, is considered feasible now in some cases because of the generally short loop circuits involved and the highly efficient subscriber station apparatus developed in recent years. It is also considered desirable in order to permit assigning a relatively high loss to the outlet-toll center circuits,

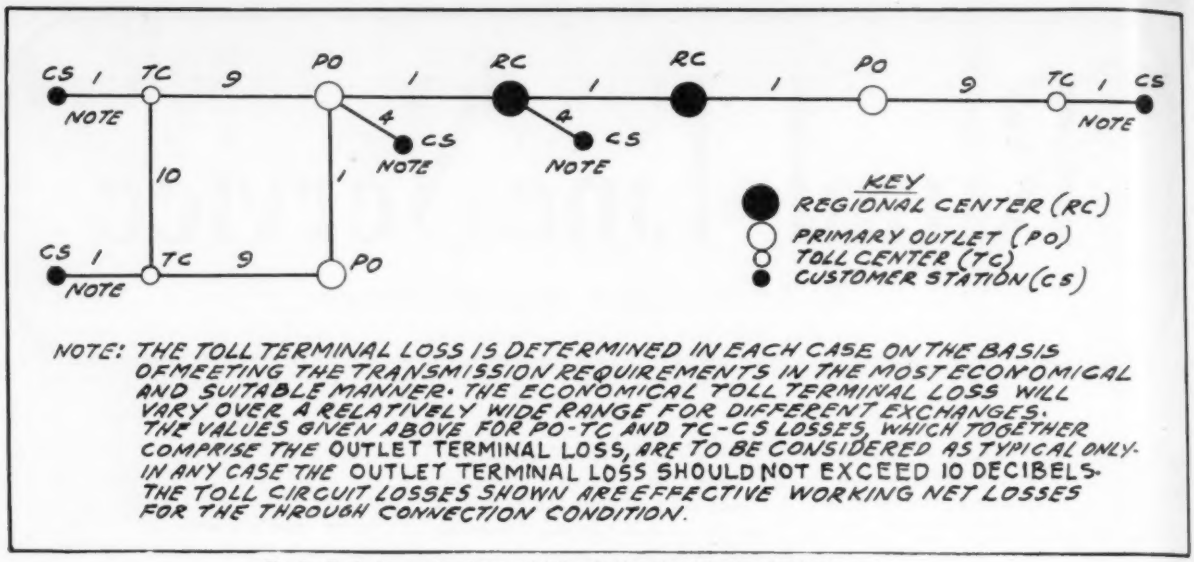


Fig. 1. Typical example of general toll switching plan (showing limiting losses).

thus providing the necessary margin of loss when these circuits operate with long-haul circuits. However, in general, the allocation of the permissible outlet loss (10 decibels) will be governed by existing plant conditions and the most economical ultimate plant layout. *Fig. 1* gives a typical example of the national toll switching plan as described above.

Rural Telephone Transmission

Due in part to the fact that town and rural distribution plant throughout the country was well established prior to adoption of the present General Toll Switching Plan, the toll terminal losses average considerably higher than shown as typical under the plan, ranging from less than one decibel to 10 decibels or more. Owing to the inherent inflexibility to extensive change of exchange (including rural) plant constructed in the past, and since plant changes are generally made on a gradual basis for economical reasons, it would appear that some time will elapse before toll terminal losses throughout the country are materially lowered. However, improved subscriber sets of higher efficiency are available and have permitted substantial reductions in toll terminal and exchange loop losses.

Based on the present situation, plans should be made to reduce toll terminal and exchange loop losses to meet requirements of the national plan whenever it is possible to do so. The trend of such losses will then be in the right direction and eventually will approach satisfactory requirements throughout the country. Meanwhile, higher loss than allocated as toll terminal loss under the plan must of necessity be tolerated. Of course, special treatment of any given case always may be applied, as required.

Rural Telephone Plant Design

Rural circuits may be considered as long exchange circuits extending into territories adjacent to their exchange base rate area. In general, such circuits should be designed to meet the maximum effective loop loss of the exchange to which they are connected. In order that transmission involving long distances will be as satisfactory for rural as for town subscribers, any neglect in rural plant design is almost certain sooner or later to result in poor transmission of long haul connections and will definitely penalize the rural service for the particular community as compared to the standards set for the country as a whole.

Maximum effective exchange loop loss means that the sum of the transmitting and receiving losses in any loop in a given exchange—taking into account the efficiency of the subscriber sets and any noise, crosstalk or distortion impairments in the loop—should not exceed the assigned maximum loop loss. For example, if the economical maximum loop loss for a given single office exchange has been determined to be 10 decibels, then the sum of the above mentioned losses (including impairments expressed in decibels) should not exceed 10 decibels for the particular type of exchange and for the types of subscriber sets used. It is not intended to convey the idea here that a value of 10 decibels for the maximum loop loss is prevalent or typical throughout the country, but it may be considered representative for some sections of the country at the present time.

In determining the maximum effective exchange loop loss, it is also necessary to consider the allowable toll terminal loss for the exchange involved. This loss is determined largely by the maximum exchange loop loss. The toll terminal loss should be determined in each case on the basis of providing the most economical combined exchange and toll plant within the respective primary outlet area.

Assuming that a maximum effective exchange loop loss of 10 decibels has been selected as the most economical and satisfactory one for a given single office exchange, then the permissible makeup of the longest loops, including rural, is shown in *Table I.*

The manufacturers' test data on HTL-85 and HTL-135 telephone line wire indicate less increase in AC resistance of the wire over the voice-frequency range than for BB wire, resulting in lower modulating effects on voice currents and consequently clearer transmission over the HTL than the BB wire. The data further show on the average approximately a 5 per cent lower 1,000-cycle transmission loss per mile for the HTL than for the BB wire. However, in the absence of data on the magneto-elastic effects (circuit noise due to wire vibration) in the HTL wire under service conditions, the approximate length of loop, as given in *Table I.* is shown the same for both HTL and BB wire.

The new steel line wires, developed in recent years and now available for telephone use, have definite advantages, both economically and from a service standpoint, over the best grades of iron wire.

Not only must transmission be considered in determining the design val-

ues for various types of facilities in a given exchange, but for common battery loops the signaling limits for the particular type of switchboard employed must also be satisfied. *Table II* shows signaling limits for several typical offices and types of facilities.

From *Tables I* and *II*, it may be seen that, with the exception of underground wire and a common battery 22-gauge loop in a 1,200-ohm office, the signaling limits rather than the transmission limits govern the permissible loop length. While the general use of long line equipment to extend the signaling limit cannot economically be justified for the usual case, it can be used to advantage in special cases and where only a relatively few lines are involved. When special long line equipment is used, the loop signaling limit is extended well beyond the transmission design limit of the commonly used loops.

One method of reducing loop resistance is to connect two cable pairs in parallel. This practice is not recommended except in unusual cases, since, for non-loaded pairs, it will increase the transmission loss and may also increase crosstalk.

Type of Facility	Approx. Length of Loop-Feet (T + R = 10 DB)	Approx. Toll Term. Loss of Loop-DB (T + R/2)*	Approx. DC Resis. of Loop (Ohms)
A. Magneto Loop (magneto office)			
26-ga. cable	25,000 (4.7 mi.)	4.6	2070
24-ga. cable	35,000 (6.6 mi.)	4.6	1810
22-ga. cable	44,000 (8.3 mi.)	4.6	1420
No. 12 (.109) BB Iron Wire and No. 12 (.109) HTL-85 Steel Wire	180,000 (34.0 mi.)	4.6	2310
No. 12 (.109) HTL-135 Steel Wire	180,000 (34.0 mi.)	4.6	2600
No. 17 Underground (Buried) Wire	44,000 (8.3 mi.)	4.6	450
B. Common Battery Loop (step-by-step office)			
26-ga. cable	22,000 (4.2 mi.)	4.8	1850
24-ga. cable	27,000 (5.1 mi.)	4.4	1400
22-ga. cable	32,000 (6.1 mi.)	4.0	1040
No. 12 (.109) BB Iron Wire and No. 12 (.109) HTL-85 Steel Wire	133,000 (25.2 mi.)	2.2	1710
No. 12 (.109) HTL-135 Steel Wire	133,000 (25.2 mi.)	2.2	1925
No. 17 Underground (Buried) Wire	33,000 (6.3 mi.)	2.5	338

*Tributary Circuit Losses, if any, are not included.

Note: No allowance is included in above losses for bridged cable or stations or reflection losses or excessive noise, crosstalk or distortion impairments.

Table 1. Approximate allowable length of loop facilities for maximum permissible effective exchange loop loss of 10 Decibels (DB). (Subscriber set assumed as most efficient available.)

Loop Loading

Loading of local loops may be carried out, if required, on some of the longer cable and buried wire loops in order to meet the established transmission limits. Loading for open wire circuits is not available. Cable loading may be H44, H88 or M88 type, although the H44 type has several advantages over the other two types and is generally recommended. Underground (buried) wire employs L44 type loading only. In any loading project, certain precautions must be taken to secure satisfactory results, such as uniform and proper spacing of coils, elimination of bridged cable taps, etc. Loading will lower the 1,000-cycle losses by about 0.6-1.0 decibels per mile of circuit for cable and about 0.6 decibels per mile of circuit for underground wire.

Noise

Line noise on open wire loops may result from series or shunt electrical unbalances in the wire or from tree leakage, but the most common cause is power line parallel usually coupled with unbalanced telephone and power circuits. Proper coordination of these two types of circuits will greatly assist in reducing the noise in the telephone circuit if unbalances are also minimized.

Room noise, as it affects telephone service, is the result of extraneous noises in the vicinity of the transmitter. Such noise effects have been materially lessened in recent years by the use of the anti-sidetone circuit in the subscriber set. Also, room noise is generally less in rural districts than in towns.

Regardless of the type of noise introduced in the telephone circuit, the effect on conversation intelligibility is equivalent to adding losses to the circuit.

Crosstalk may become excessive and intolerable, if two or more circuits parallel each other closely for some distance without proper transpositions. Such crosstalk has the effect of increasing loop losses and should be eliminated. Of course, where the circuits are grounded, transpositions cannot be used and a satisfactory remedy may present numerous problems more or less difficult to solve.

Multi-party rural lines usually have a number of bridged stations on one circuit. If a conversation is in progress

Type of Facility	Approx. Permissible Length of Loop-Feet (Signaling Limit of Office-Ohms-DC) 635	750	835	1200
26-ga. cable	7,900 (1.5 mi.)	9,000 (1.7 mi.)	10,000 (1.9 mi.)	14,300 (2.7 mi.)
24-ga. cable	12,100 (2.3 mi.)	14,300 (2.7 mi.)	15,800 (3.0 mi.)	23,200 (4.4 mi.)
22-ga. cable	19,500 (3.7 mi.)	23,200 (4.4 mi.)	25,900 (4.9 mi.)	37,000 (7.0 mi.)
No. 12 (.109) BB Iron Wire and No. 12 (.109) HTL-85 Steel Wire	49,000 (9.3 mi.)	58,000 (11.0 mi.)	65,000 (12.3 mi.)	93,500 (17.7 mi.)
No. 12 (.109) HTL-135 Steel Wire	44,500 (8.4 mi.)	52,300 (9.9 mi.)	58,000 (11.0 mi.)	83,500 (15.8 mi.)
No. 17 Underground (Buried) Wire	62,400 (11.8 mi.)	73,500 (13.9 mi.)	81,500 (15.4 mi.)	116,000 (22.2 mi.)

Note: Insulation resistance of any common battery loop should not be less than 10,000 ohms for manual and 15,000 ohms for dial offices.

Table 2. Approximate permissible length of loop facilities of various types to meet signaling limits for several typical types of switchboards. (Common battery loops only.)

involving one of the stations and another station on this same line removes the receiver from the hook and "listens in" on the conversation, a low impedance path is thus bridged directly across the line and serious impairment of transmission generally results. This impairment is more severe in common battery talking loops than in magneto loops. When the number of stations "listening in" increases, the impairment also increases.

Various means are employed to circumvent the tendency to "listen in." Signaling may be semi-selective or full-selective and station signaling of the central office may be on a simplex basis so that station bells, other than of the station using the line, do not all ring on in and out calls.

There is also available on the market a new type hand telephone set with a two-step hook-switch. This set is so arranged that when the handset is lifted from its cradle to ascertain if the line is busy before placing a call, only the relatively high impedance receiver circuit is bridged across the line. In order to dial or talk a push button must be operated after removing the handset from its cradle. This set should be of material assistance in limiting "listening in" losses.

Where tube type or high impedance ringer subscriber sets are used on multi-party lines, the bridged loss of the station ringers is usually negligible. With the older low impedance ringers the bridged ringer loss may be about 0.2 decibels (T/R) per ringer. This is additional loss in the loop, which must be considered in the design of the plant.

In extreme cases of poor transmission where other suitable means of improvement are not available or practicable, a simplified telephone repeater, to provide the required gain, may be used, if the cost is justified. Such repeaters are now available for either AC or DC operation.

In the early days of telephone development, rural telephone systems were built to serve immediate or relatively short term local needs. When these systems increased in size, the design was still largely based on such needs and on the material available for their construction. As a result, much of the existing plant design in rural areas exceeds the standards of good transmission, as presented under the General Toll Switching Plan, although, in general, serving reasonably well the local requirements. Some rural plant, built in recent years, has been constructed to meet in large measure the requirements of the plan. In some of these plants copper or copperweld wire circuits and the most efficient type of subscriber sets have been employed either on a common battery-local battery or a full common battery basis.

It appears that, in the future, existing rural plant gradually will be improved to meet current standards of transmission, as changes in plant occur due to deterioration or other causes.

Rural service should in time be greatly improved and extended, particularly to isolated sections, by the use of carrier and radio, both of which are under active investigation for use in commercial rural as well as other services.

Finally, new rural plant design will most certainly take into consideration national as well as local requirements, if the future needs of the rural subscribers are to be met. Rural communities no longer can be considered as isolated regions in a country where the people in general travel so extensively and the interests of both town and rural populations are spread throughout the land.

(To Be Continued)

Correction

In the article, "Rural Line Service," by John D. Taylor, TELEPHONY, December 29, 1945, an error appears, in the second paragraph on page 24 of the article.

The sentence reading: "It must be remembered, however, that as the span increases greater sag and thus lighter poles for clearance are needed and wider separation of wires is required," should read, "It must be remembered, however, that as the span increases greater sag and thus higher poles for clearance . . ."

» To go about your work with pleasure, to greet others with a word of encouragement, to be happy in the present and confident in the future; this is to have achieved some measure of success in living.

Service

Service has as many angles as it has participants. Whether one is exalted to the highest office in the land, or is consigned to the humblest vocation of life, if he expends his best, that which justly is expected of him by society, he renders a service to humanity. He is, by and large, a public servant. If he serves to his best ability, whether his position in life be of menial or dignified estate, the servant is equally honor worthy.—**Indiana Telephone News**

Prankster Causes Telephone Deluge!

Jackson P. Dick, Atlanta, Ga., was in a murderous frame of mind on January 28, because an advertisement—the kind that thousands of homeless people in Atlanta were waiting for—appeared in a local newspaper. It read:

"For Rent: Four room house with gardenia bushes, Scuppernong arbor and berry patch. Reasonable. Open for early occupancy." Replies were directed to two telephone numbers—one to Mr. Dick's residence, the other to his office in the Georgia Power Co. building.

"We had to put on a special telephone operator in the office," Mr. Dick said. "There were more than 500 telephone calls yesterday morning and they started coming in at 7 o'clock.

"At home the telephone rang continuously, and finally we had to have the telephone company disconnect it.

"I didn't put that ad in the paper and I haven't got a house for rent. Some friend of mine must have done that for a prank, but it's a dirty trick—not only on me but on the thousands of people who had hopes of finding a place to live. I'd like to break the neck of whoever did it."

Approval of the Wage-Hour amendment to the Fair Labor Standards Act by the Senate Labor Committee is of special significance to the operating telephone industry. . . . Shakeup of President Truman's price and wage control machinery does not have immediate application to telephone companies.

THE SENATE Labor Committee has finally and officially approved the wage-hour amendment to the Fair Labor Standards Act. Originally introduced by Senator Pepper (D., Fla.) this bill has been referred to several times by this department because of its special significance to the operating telephone industry.

Also, your correspondent wishes, in the interest of accuracy, to correct two details of erroneous reporting which slipped into these pages a fortnight ago. The principal impact of the bill, as reported by the Senate committee is, of course, the fact that it would increase the minimum wage to be paid, by all industries subject to the act, from 40 to 65 cents an hour.

The special significance of the committee's bill to the telephone industry is that it would increase the exemption of the present Wage-Hour Law for operators of telephone exchanges having less than 500 stations to the amount of 1,000 stations as the limiting standard of the exemption. In other words, telephone operators employed at exchanges with less than 1,000 stations would not be subject to the Wage-Hour Law if the Senate committee's bill were enacted in its present form.

And now for the correction of the two errors previously made in this department. First, it was stated that the new exemption would not apply to Bell System companies, but only to Independent operating companies. That is not true. It would apply to all telephone companies within the station limitation, regardless of corporate affiliation or ownership. Secondly, it was erroneously stated that the bill would remove the time-and-a-half pay for overtime, provided by the present Fair Labor Standards Act. Such is not the case as the Senate committee bill would make no change in this respect except in certain special situations, which have nothing to do with the telephone business.

Otherwise, your correspondent's earlier story on this situation still stands, together with the forecast made as to the probable outcome. Briefly that was: (1) The Senate as a whole may cut down on the increased minimum of 65 cents an hour before passing the bill, and the House would do so in any event; (2) Also forecast was the likelihood that the House might delay action so long that the bill could get tied up or deadlocked, with no legislation resulting this session. Some legislation modifying the Senate committee bill, however, was thought to be more probable; (3) Finally, it was predicted that the 1,000-station exemption for telephone switchboard operators has a very good chance of standing in the law without change — as the law is finally enacted.

* * *

Coming now to the last shake-up of President Truman's price and wage control machinery. Readers probably are wondering just what it all means and how it may affect them. First of all, there is another shuffle in the face cards of leading administrative officials in charge of the program. Paul Porter, who has, during his short time, been such a successful chairman of the Federal Communications Commission, has been switched to the top spot in OPA. It is not a permanent change, however, and Commissioner Charles R. Denny will only take over the acting chairmanship of the FCC while Porter is "on leave," so to speak, to take care of his OPA duties. This may mean that technically there is no vacancy on the FCC, although if difficulties develop there for lack of a deciding vote, President Truman may decide to appoint somebody else a little later on.

Chester Bowles moves up from the OPA hot spot to become the new director of the Office of Economic Stabilization.

Here is how President Truman's new machinery will work with respect to wages:

Wage increases that will be approved by the government are as follows:

(1) Increases "consistent with the general pattern of wage or salary adjustments" made since August 18, 1945, in an industry or in a local labor market area. The "pattern" in the big mass production industries is an increase of around 16 to 20 per cent.

(2) Increases necessary "to eliminate gross inequities as between related industries, plants or job classifications."

(3) Increases necessary to correct substandards of living.

(4) Increases necessary to offset the increase in the cost of living between January, 1941, and September, 1945 (33 per cent, according to the Labor Department).

Wage and salary increases, in general, must be approved by the government, if they are to be used as a reason for price increases. The stabilization administrator may grant exceptions.

Employers who raise wages without government exceptions or approval forfeit their claim for price increases. In certain cases, the administrator may declare wage increases unlawful even if they do not involve price increases.

Wage increases made legally before this, or made in accord with government recommendations already issued, shall be valid. This applies to the recommended settlements in the steel, General Motors, and meat packing strikes, for instance.

* * *

The OPA does not now and never did have jurisdiction over fixing utility rates. So, to that extent, the new Truman order with respect to prices does not have immediate application to telephone companies. To the extent, however, that telephone companies must buy materials and equipment on which price increases may be forthcoming, here is how the new Truman machinery affects price fixing generally:

"The price administrator shall promptly provide for the adjustment of price ceilings in any case in which he finds that an industry is in a position of hardship as a consequence of an approved increase in wages or salaries." This eliminates the present provision that an industry or firm must wait six months to show a hardship.

The price increases, in general, shall be sufficient to permit an industry to pay an approved wage increase and still equal its prewar rate of profits.

However, the price increases shall not be that large while the industry is operating "at a temporary low volume."

Going over the bare language of the executive order, your correspondent ventures the conclusion that it practically amounts to a compromise between the Bowles-Porter viewpoint and the viewpoint advocated by John W. Snyder, director of reconversion. The Bowles-Porter attitude is to hold the price ceiling line at any cost regardless of changing wage levels. Snyder would allow prices to increase where necessary to absorb increased operating costs such as wage boosts.

On behalf of the Bowles-Porter school of thought, Truman has placed the two main exponents of "hold-the-line" in charge of the two government bureaus with discretion to allow or disallow price increases in particular cases. It is to be expected that both Bowles and Porter will use this discretion along lines repressing price increases as much as possible.

On behalf of the Snyder school of thought, on the other hand, President Truman has made possible the removal of price ceilings where necessary to cover government-approved wage increases. This removes the biggest stumbling block in the settlement of such labor disputes as the great steel strike which had been plaguing the country. In plainer words, wage and price increases now are allowed to some extent, subject to the veto powers of Bowles and Porter.

Note, also, that the order virtually re-establishes the old War Labor Board (which died last New Year's eve) under the new name of National Wage Stabilization Board.

* * *

The big political explosion resulting from the resignation of Secretary of Interior Ickes will probably be pretty cold turkey, from a news standpoint, by the time these lines appear in print. But just the same, the incident should not pass without some commentary on the departure of Ickes from the special viewpoint of the public utility industries. One is tempted to sum up this entire viewpoint with the supreme understatement: "The public utility industries generally are reconciled to the loss of Harold LeClair Ickes as secretary of interior."

As a matter of fact, Ickes was second only to the late President Roosevelt in effective, persistent and aggressive promotion of public ownership in the field of public utility operations. Because of the nature of the Interior Department's work, the irrascible Ickes came into hostile contact chiefly with the electric power utilities. But he had no love for any form of private enterprise in the public utility business. Whatever his talents and capabilities as a general administrator were, Ickes remained at all times a harsh critic of privately owned and operated utilities and an undiscriminating promoter of public ownership.

"Honest Harold," to use the name conferred upon him in sarcasm by the columnist Westbrook Pegler, well may have earned a valid reputation for being technically honest with the public funds. But in his effort to promote public ownership, honest reporting compels this writer to say that his methods were never entirely above criticism.

As public works administrator he assiduously bribed cities and communities with federal funds to embark on publicly owned utility ventures. He cared little for democracy in the form of home rule whereby cities and communities might be encouraged to exercise their own choice on whether they wanted to go into the public utility business. In the case of San Francisco, for example, he attempted for eight years to ram public ownership down the throat of an electorate which insisted on spitting it out eight times with an ever-increasing majority of votes. Ickes did not care what the people of San Francisco wanted. He was determined to make them have public ownership. As long as they refused he persecuted them under a federal statute which he strictly interpreted as forcing San Francisco to distribute her own electricity or do without it.

On the other hand, Ickes showed no such scruples about the strict letter of the law when a House appropriations bill refused to allow him certain sums to build a power transmission line to compete with a private electric utility in California. The intent of Congress was made very clear in a committee report which Ickes proceeded to defy by building the line anyhow and making no reasonable justification for his action. Ickes encouraged state legislatures to relieve municipalities from civic responsibility by enacting so-called "Ickes laws," drawn up and notched out of Washington for the state capitals. One of these laws would allow issuance of revenue bonds to finance public ownership ventures in the utility field without regard to constitutional or statutory debt limitation of these public agencies and in some cases without even a vote of the local electorate.

Ickes has spent other people's money for public works and for building up a giant bureaucracy at a rate unprecedented even in an administration which broke all records for profligate expenditures. For example, when Ickes went to the Department of Interior as technical head of the Indian Bureau, that agency had less than 5,000 employes. Today it has more than 8,000 employes, not owing to any increase in the number of Indians, but solely to

(Please turn to page 22)

COOK TYPE UX

Cable Terminal

Designed to facilitate installation and service in manhole termination and distribution of underground cable systems, the Type UX Cable Terminal (unprotected) combines many features which have made it popular with telephone men everywhere.

The lateral cable enters through a well in the cable chamber into which solder is puddled so that a strong, moisture-proof connection is made. A patented metal strap on the mounting bracket clamps the cable to prevent injury to the cable at the joint between the cable and terminal. The terminal may be mounted with cable stub out of top or bottom.

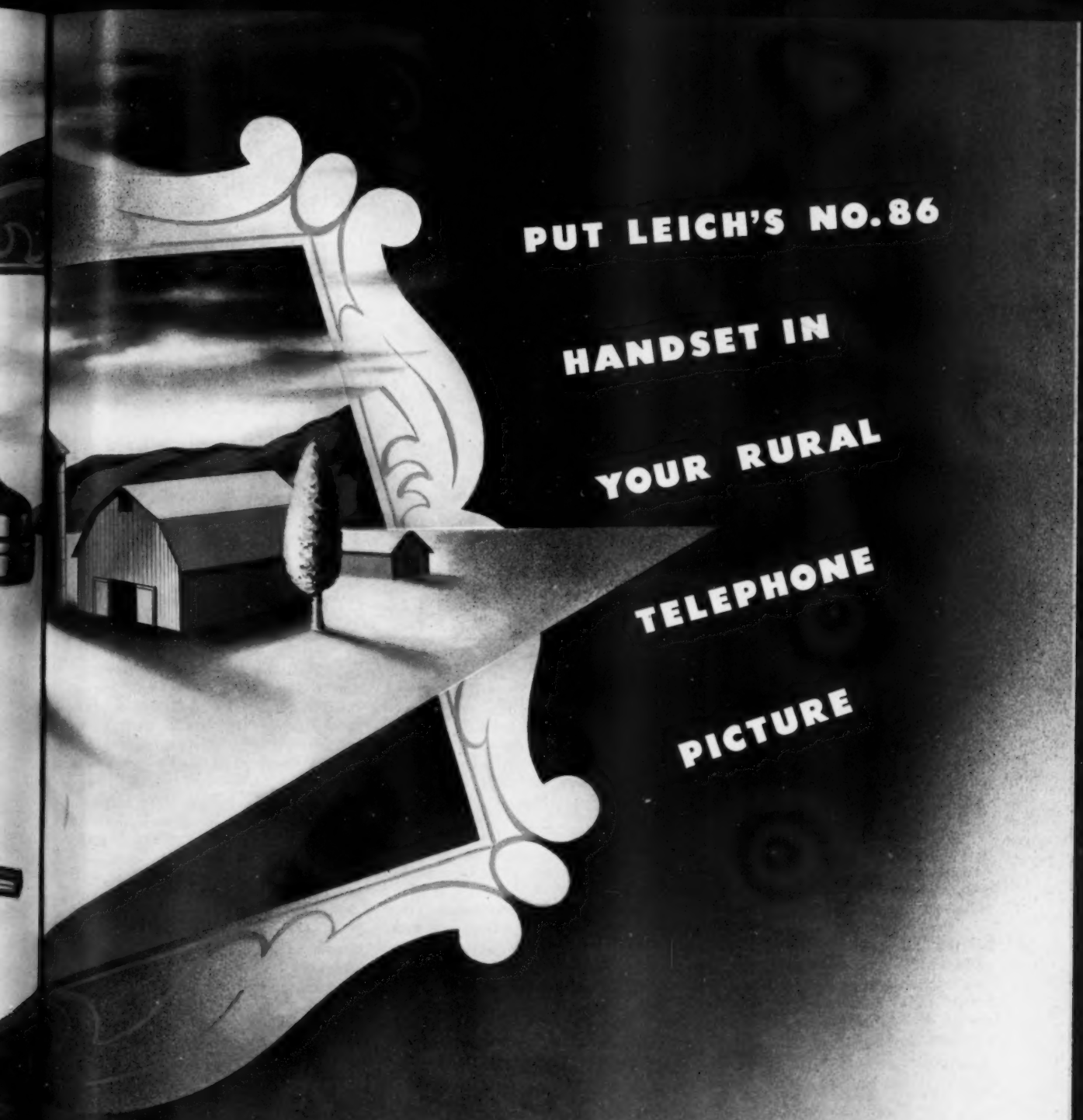
The terminal provides for service outlets. These outlets in the sides of the terminal are sealed with a brass pipe plug having a 3/8" pipe thread. Lead sheath of instrument distribution cables are terminated in heavy brass stuffing boxes set in the service outlets. The face plate is made of a single piece of moulded bakelite of great strength, low moisture absorption, and high electrical resistance under all conditions.

COOK ELECTRIC Company

Telephone Protection & Distribution Engineering Since 1897

2700 SOUTHPORT AVENUE • CHICAGO 14, ILLINOIS

LEICH
MANUFACTURERS OF TELEPHONES, SWITCHBOARDS, AND RELATED APPARATUS SINCE 1907



PUT LEICH'S NO. 86 HANDSET IN YOUR RURAL TELEPHONE PICTURE

As you may have noticed in an adjacent or nearby property, Leich's No. 86 handset is rapidly becoming the rural telephone of the day. Nor is this surprising when you consider its four-fold extra features: (1) Modern, all-molded case; (2) Full handset convenience—may be mounted at any height suitable for the user; (3) Convertible to separate desk set and generator box when this type of installation is preferred; (4) Powerful new-type Alnico generator to replace all former three-, four-, and five-bar types. Note that these are all *extra* features—in addition to the fine transmitting and receiving qualities and other sound construction details common to all Leich telephones.

Consider the part the No. 86 can play in your rural development program. For descriptive circular, write Leich Sales Corporation, 427 W. Randolph St., Chicago 6, Illinois.

the more thorough and intensive work of the bureau. During the 10 years from 1933 to 1943, during which Ickes has been the Great White Father, Uncle Sam spent over $700,000,000 on the poor red man — this as against $175,000,000 in the preceding 10 years, or an increase of 300 per cent. All this during an era when the actual number of reasonably full-blooded Indians has been constantly decreasing.

In other words, we are spending more and more money today on fewer Indians than ever in our nation's history. This state of affairs should be very encouraging—to the Indians. One is tempted to remark that there is more future in being an Indian in the United States than there is in being a taxpayer.

To pick up another example, when the Board of Geographical Names was transferred to Ickes' department, it had only three employes. Before the end of 1943 it had 300 employes. This bureau, which used to get along on $5,000 a year, during 1943 spent at the rate of $300,000 a year. Its principal purpose is to tell us how to spell and pronounce the names of our various communities correctly.

These are just little peanuts in the financial bag of the Department of Interior. The gigantic growth of the Reclamation Bureau, both in expenditures and number of employes, and the recently organized Power Division, are too vast to attempt even cursory descriptions without considerable research. Suffice it to say that Ickes, before he left the Department of Interior, was head of the biggest power trust on earth. He controlled the production of one out of every 10 kilowatt hours generated for sale in the entire United States. When Ickes first came to Washington in 1933, he was looking for the modest job of Indian commissioner, which pays $10,000 a year. He was then already a middle-aged lawyer from the Middle West, of no particular success or notoriety.

SURE, WE'LL GET YOUR TELEPHONE IN THIS AFTERNOON, MAM
WE'VE INSTALLED AN EXTENSION IN THE ATTIC, MAM, AND TWO IN THE FRONT BEDROOM. NOW, DID YOU SAY THE EXTRA LINE GOES IN THE GUEST ROOM?
HM-M LETS SEE NOW
"HOW SOON CAN I GET A TELEPHONE?
AHEM?
WHY AN EQUIPMENT SHORTAGE?
PLEASE LIMIT YOUR CALL TO 5 MINUTES

Courtesy Long Lines

A careless observer, considering Mr. Ickes' background on that day of arrival, but not knowing him very well, might have been inclined to write off his chances of getting much notice in the play that was just opening on the political stage in Washington. Such an observer would certainly never have expected Mr. Ickes to become the avenging angel of the New Deal, the Gideon of the Palace Guard who has smitten and confounded not only the enemies and critics of the cause, but even some pretty high-class and flashy professional competition in the very shadow of the throne. Gone are many of the proud politicians who dared cross swords with the self-styled curmudgeon.

The supposedly meek little lamb who crept into the Union Station in 1933, blinking through his thick-lensed glasses, turned out to be anything but meek and self-effacing. He became instead the Lion of the Potomac, whose roars caused even the brain trusters to tremble in their cliff dwellings up and down Pennsylvania and Constitution Avenues.

Harold Ickes' success story seems to indicate that the traditional Horatio Alger approach still is valid; only the location has changed. It isn't New York City any longer where the poor but honest boy (or middle-aged man) should start rising—it's Washington, D. C. Mr. Ickes' success has been obtained, in part at least, by savagely attacking certain private business practices and then successfully appropriating them to his own use in conducting public business. It takes a clever man to do that.

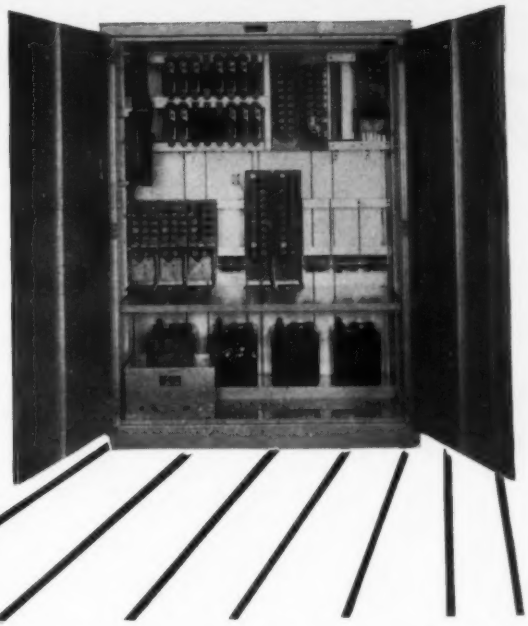
Importance!

The earth is dependent upon the fuctioning of every element to perform its individual work in its great task of perpetuating existence and life. It is no more important for the great sun to shine than it is for the lightest breeze to blow. Any organization, large or small, has its departments, and the one is ever and proportionately dependent upon the other.

While there is no censure to be given the one who aspires to a higher position, there is just criticism due that one who, because he cannot be at the top, minimizes the importance of his station and doesn't give the best in himself to the task allotted him. It is necessary to the well-being of the organization that each member consider with pride and respect his individual place in it.

Each department is vital to the whole organization, and, like a great chain, it is no stronger than its weakest link. There is nothing else quite so conducive to true contentment than the realization of a duty conscientiously performed, and nothing more worthy of honor and advancement than the manifestation of a job, however humble, well done.—**Indiana Telephone News**

Attract New Income
Promote PABX's



There is a fine opportunity for every telephone company to realize additional income in the years ahead, by promoting the installation of Automatic Electric P-A-B-X's. The number of "live" prospects is large—including factories and business houses which are already "sold" on interior telephone service but have not been able to obtain installation during the last few years.

Automatic Electric P-A-B-X's provide the lightning-fast intercommunication these subscribers are looking for. And in addition they provide central-office trunk service on outgoing calls, and incoming service through an attendant (or if desired on some of the systems, this service can be provided without a regular attendant— an ideal arrangement for smaller organizations). Thus, the P-A-B-X is not only an interior telephone system, but a complete, coordinated system of telephone communications.

Your business subscribers will gladly pay the necessary rentals to secure this effective "streamlining" of their communications. Prepare now to attract new income through the promotion of Automatic Electric P-A-B-X's. We shall be glad to help you.

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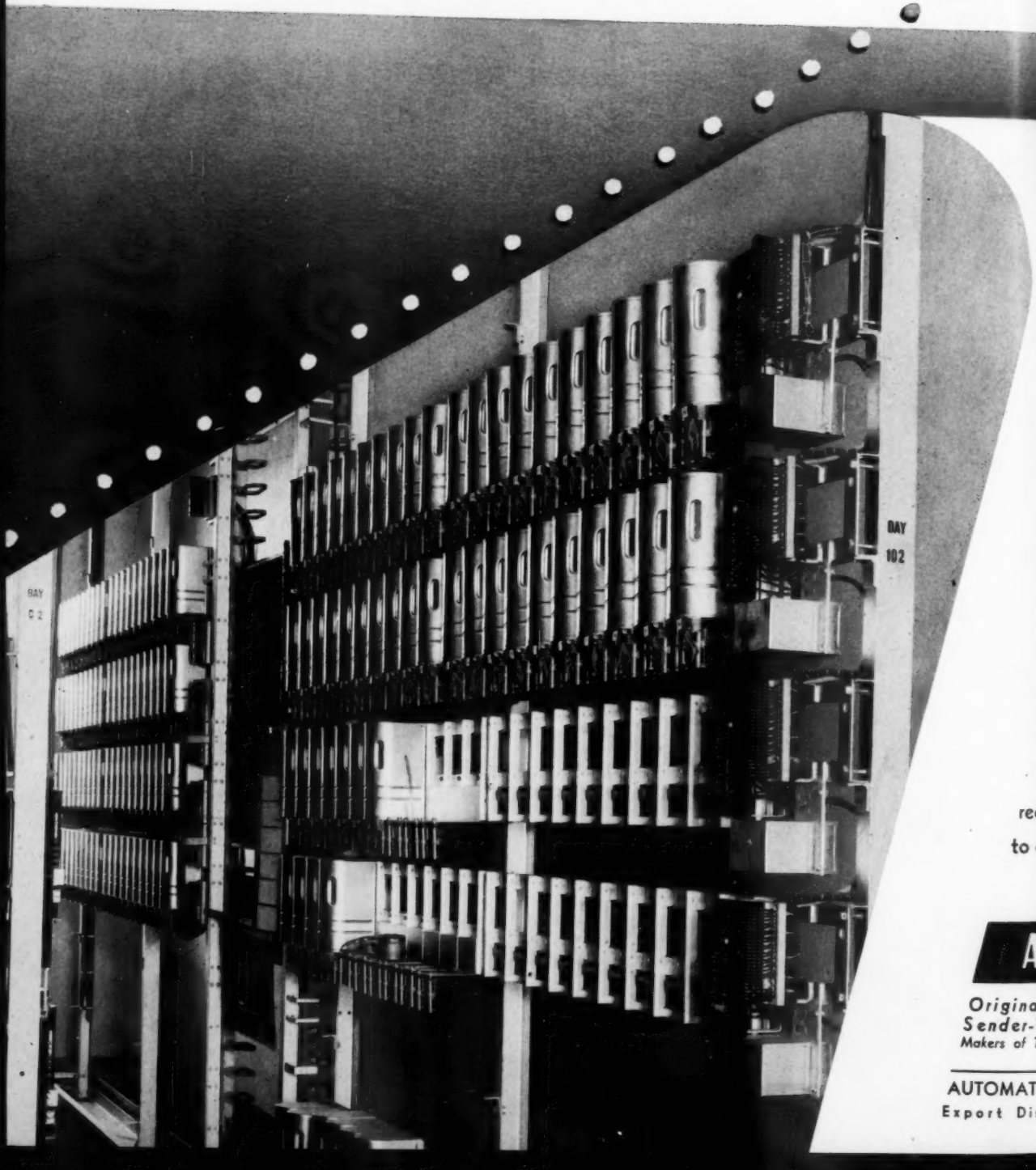
What do YOU *want it to do?*



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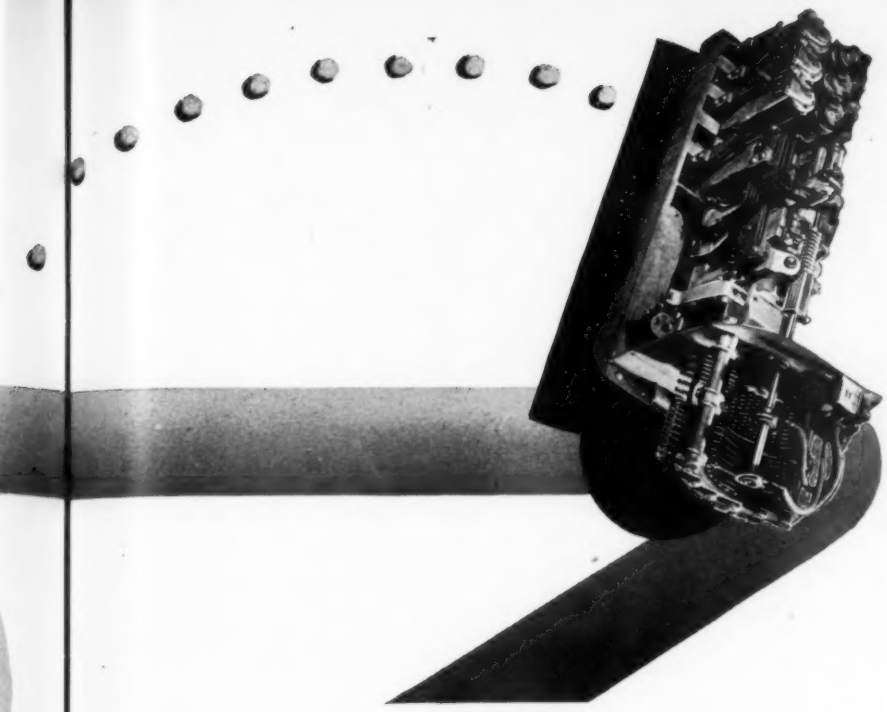

It's the Strowger switch—heart of the Strowger system, and key to all the
es this system provides. It's ready to do what you want it to do!

In the small community exchange, it serves as the entire operating staff—
tically completing local calls, directing toll calls to the operator at a distant
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ary flexibility provides complete freedom in exchange arrangement, and
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toll switching, it speeds up service, improves toll-line efficiency, saves
operats. It serves also in the most modern and comprehensive automatic
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to this versatile switch, Strowger equipment will meet all future
equirem change or growth. Performance has proved that it's ready, always,
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ABC of the Telephone

By FRANK E. LEE

PART XVIII. Theory and Operation of the Dial. The seventeenth article in this series appeared in the February 16 issue, page 13.

BACK in the 1880's, when the telephone was advancing from the gadget stage into a practical device, Alexander Graham Bell stated that some day one telephone would be connected to another telephone without requiring the services of an operator. Today, the truth of this prediction is supported by the millions of dial operated telephones in use throughout the world.

The first objective of this installment is to discuss the electrical and mechanical features of the dial itself. The second objective is to sketch the theory of dial switching systems.

The purpose of the dial is to set up impulses or pulses of current in the telephone circuit. These pulses are set up by the movement of the dial wheel. One movement of the dial wheel will create a single pulse or a chain of pulses ranging between one and 10. In the operation of the dial wheel, there is a short spacing interval of time between each series of pulses. This interval is most important because it allows the central office equipment the necessary time to keep pace with the operations of the dial. Since the central office equipment is controlled by the dial, then the user of the telephone remotely operates the central office switching equipment by turning the dial wheel.

The number of the called telephone must be known and dialed correctly in order to complete a connection over a dial telephone. The number of dial digits in a call number is determined by the number of telephones connected to a particular dial system. In a community where a call number of a certain telephone is 54, the dial translates this number into a chain of five pulses followed by a chain of four pulses. For use in this system, the number plate has the numbers only from one to zero arranged in proper sequence counterclockwise around the dial.

In a larger system, the call number is preceded by a prefix, such as South Shore 0169. For dialing purposes, it is necessary to use the first three letters of the exchange name, S-O-U followed by the four numbers, 0-1-6-9. In this service, both numbers and letters appear on the dial plate.

It makes no difference whether any one of the three letters or the number itself is selected from those markings visible through a certain opening in the dial wheel if the wheel is turned in a clockwise direction until the finger strikes the finger stop and then is released. The dial will set up a corresponding chain of pulses of direct current in the line circuit. The subscriber may be thinking of a letter, but the dial sets up a certain number of pulses in the circuit as the dial wheel is turned.

Theoretically, it would be possible to use numerals only for all telephone numbers. In actual practice, however, numerals only are, in general, limited to central office areas where there are less than 10,000 stations. This number of stations could be handled in a single central office unit and there would be only four digits in each telephone number.

There is a well grounded reason for limiting the number of digits in a telephone number. Scientific research has shown that the average person can retain by memory four digits in their proper order. When the group is increased to five digits, several persons of a group would fail to remember all the figures given, let alone remember them in their proper sequence. When the group is increased to seven or eight digits only those people with exceptionally retentive memories will be able to repeat the numbers in their proper sequence.

To circumvent this natural human element, prefixes are used in conjunction with numerals. This system permits the number of digits used to be held to a minimum. In summing up this condition, even though the subscriber is dialing the first three letters of an exchange name followed by four numbers, the dial is sending a series of seven groups of pulses into the line circuit equipment.

The dial used in larger exchange areas may be arranged in the following manner:

1	2	3	4	5	6	7	8	9	0
	ABC	DEF	GHI	JKL	MNO	PRS	TUV	WXY	Z Operator

The dial impulse springs are connected directly in the subscriber's line circuit. The dial mechanism is arranged to open and close these two springs between eight and 13 times per second, depending entirely upon the speed with which the central office switching equipment can absorb the impulses.

There are fault possibilities from a dial that returns to normal at too slow a speed as well from one returning too fast. If the dial is too fast, some of the impulses may not register on the central office equipment. In some circuits, too fast a dial will cause positive trouble in the switching apparatus

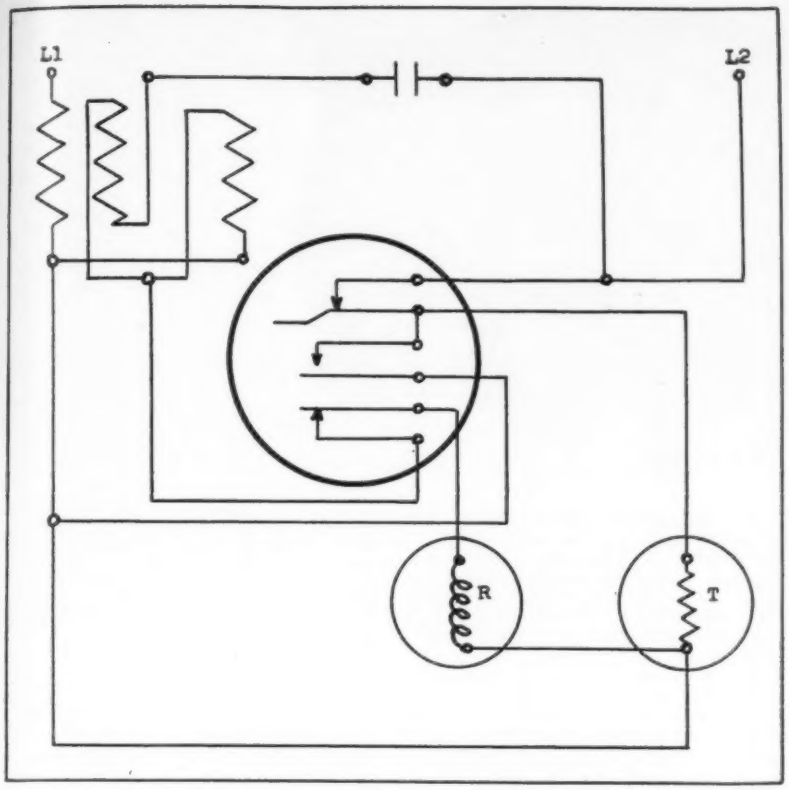


Fig. 1. Standard anti-sidetone circuit—dial normal.

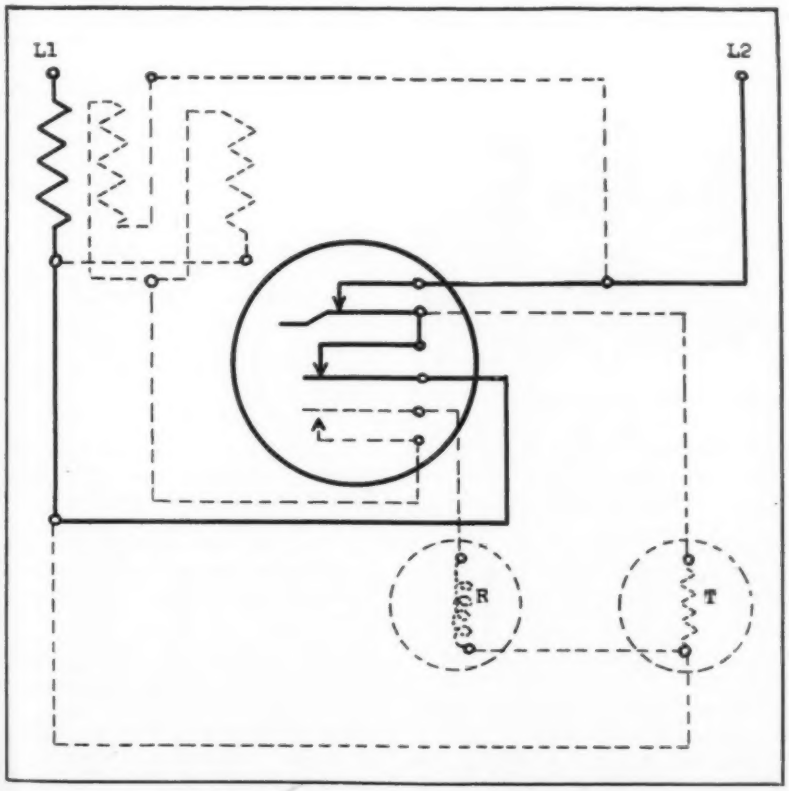


Fig. 2. Parts of a standard anti-sidetone circuit—used during dialing interval.

whereas, in others, it would be slower in appearing.

On the other hand, a slow dial or a dial that permits any unusual minor interruptions in each sequence of pulses will cause false groups of pulses to be sent into the switching equipment. For example, the digit eight from a slow dial might register as five followed by three. It is obvious that a dial must operate at the proper speed free from interruptions if it is to send the proper signal to the central office.

To insure proper speed, dials are equipped with an adjustable governor. Regulation of the governor changes the speed of the dial as necessary to meet the requirements of a particular central office.

With the dial impulse springs directly in the line circuit, the rapid pulsing of the line current would create corresponding clicks in the receiver circuit of the calling telephone. Most dials are equipped with extra contact springs that operate when the dial wheel is turned off-normal. In some dials, one pair of these extra springs is connected across or in parallel with the receiver. When the springs close as the dial wheel is turned off-normal, the annoying clicks are shunted around the receiver.

In other dial circuits, the receiver circuit is wired through a set of extra dial contacts that are normally closed (See *Fig. 1*). When the dial is turned off-normal, these contacts break to open the receiver circuit.

For best dialing results, it has been found that the variable transmitter resistance should be removed from the line circuit when the dial is being used. In most dials, a third pair of contact springs close when the dial is off-normal to place a solid short across the transmitter. As a result, the dialing circuit has a fixed resistance, the transmitter is shunted out of the circuit and the receiver circuit is opened. (See *Fig. 2*). This is the same circuit as shown in *Fig. 1* except the elements not in use while dialing are shown in dotted lines.

In order to produce best results, these extra contact springs must open and close in the proper sequence. Whether they do or not can be determined as the dial returns to normal. In a dial where the receiver circuit is opened as the wheel is operated, the transmitter shunt springs, on returning to normal, must open before the receiver dial springs close. If the receiver springs close first, a click will be heard when the transmitter shunt is removed.

As previously mentioned, the main

(Please turn to page 35)

THE PLANT MAN'S NOTEBOOK

BY RAY BLAIN • TECHNICAL EDITOR

SPEAKING of the privacy of telephone conversations makes us wonder why some of the larger telephone companies have not exercised more care to sound-insulate their pay-station booths. The writer was in a small drug store one evening lately and, with two other persons, could not avoid overhearing one side of a most embarrassing telephone conversation which was taking place in a booth. This is not intended as a reflection on telephone booth manufacturers for we are aware that soundproof booths are now being built though they are not always used. It would seem that all up-to-date and progressive telephone companies would do well to test their booths in order to make sure that they meet certain approved standards.

* * *

It is very gratifying to note that metal telephone office signs again are available. We believe that each and every Independent telephone office should be properly designated by an attractive sign.

* * *

A resume and analysis of the necessity for telephone recording indicates the following principal needs for this auxiliary to modern telephone communication:

(1) Telephone communication proves better than any other means of communication when speed is required, but without recording is not accurate enough when details such as figures, etc., are transmitted.

(2) Stenographic recording of telephone communication is not sufficiently accurate, and there is only a limited number of qualified stenographers who can accurately record an ordinary telephone conversation in shorthand. Also, stenographic recording is expensive and unless a special telephone monitoring set is employed, the telephone transmission is impaired.

(3) Individual telephone conversations often cover a variety of subjects, the details of which may require subsequent review by several persons in order to clear the subject and any questions of doubt. Voice recording in this and similar cases proves invaluable.

(4) A voice record of important telephone conversations in detail as provided by a voice recorder, in general, is considered of utmost importance.

* * *

The design of telephone equipment gradually is adopting the practice of using jacked-in parts. This arrangement presents numerous advantages in that parts may be removed for inspection and repair. Parts could even be returned to the manufacturer for overhaul, as required. This would prove a real advantage for some of the smaller telephone companies that might not have qualified personnel to make repairs locally.

The accompanying photograph shows a multiple plug and jack arrangement which is considered suitable for telephone use.

* * *

"Human life is a great and wonderful thing—too marvelous to allow a careless act to snuff it out. It was the belief that human life was worthwhile that caused the safety movement to be born: The belief that a man, to be the greatest benefit to society, should live out the fullness of his life." So states John A. Thompson, Safety Methods Supervisor, in *Southern Telephone News*.

* * *

It is claimed that the recent Signal Corps radar contact with the moon will contribute much towards the nation's study of wave propagation.

* * *

We have heard considerable discussion of late as to what kind of markers should be used to designate the location of cross-country buried cable. Some companies have used concrete posts about five inches square and five to six ft. long. Suitable signs and markers were attached with screws. While this system makes a good marker, the signs and number plates often are damaged by vandals. It is claimed that even plain iron pipes with suitable number plates often are damaged. We wonder if any of our readers could give useful information as to what type of marker is considered suitable for use on long, buried cable routes.

* * *

The writer's co-worker and assistant, Harry F. Bossert, was transferred from the Plant Engineering Agency in Philadelphia, Pa., to the Engineering and Technical Service, Office of the Chief Signal Officer in Washington, D. C., effective February 11, 1946.

* * *

Plastic insulated wire for main frame jumpers, inside house runs and for duct work has been available for years and has been used extensively on special communication work. It is pleasing now to note that some of the larger telephone companies have

adopted this procedure and are using this wire. There is actually no reason why any wire for the purposes mentioned above should be provided with a braid covering. The plastic insulation proves adequate in every way and certainly is more convenient to use than the braid covered type.

* * *

A friend of the writer, who lives in an old-fashioned four-room house in Philadelphia, having one room on each floor, often experiences inconvenience when the telephone rings. When the telephone rings he is usually on one of the other floors, and during the war, extensions were simply not to be had. To overcome this annoyance, the telephone was installed in a dumb-waiter which connects all floors with a long length of wire to maintain a connecting trailing in a loop. When the telephone rings, the dumb-waiter is pulled to that particular floor and answered. This arrangement has proved entirely satisfactory now for over two years.

? ? ? Plant Man's Quiz ? ? ?

The "Plant Man's Quiz" department is for your use. Send in questions on any troublesome problems you may have concerning plant construction, repair or maintenance and they will receive the expert attention of Ray Blain, our technical editor. Address your questions to Ray Blain, c/o TELEPHONY, *608 S. Dearborn St., Chicago 5, Ill.*

Q. We would like to know what splicing oil is and how it is used in cable splicing.

A. This is a light mineral oil, slightly heavier than kerosene, and is sometimes referred to as cold stripping oil. When oil of this type is applied, it is quickly absorbed by paper pulp insulation and penetrates well into it. For this reason, the light oil permits more rapid drying of the insulation than does ordinary paraffin or a heavy oil.

Splicing oil is used for stiffening the insulation so that it will break off at the sharp bends where the two wires first are brought together in preparation for splicing.

Most pulp insulation can be stripped satisfactorily without the use of oil or other treatment. Some splicers prefer to work the insulation completely dry while others prefer the oil treatment. Pulp insulation does have a tendency to toughen and become difficult to strip after exposure to a humid atmosphere for any length of time.

Q. Do we need protectors on all telephone stations?

A. In general, all exposed telephones served by aerial conductors need protection. If the station, or any part of the line, is exposed to disturbances from lightning or to direct contact with a foreign circuit carrying more than 250 volts, it may be considered an exposed station.

Q. I have seen the term V-H-F transmission applied to radio communication. What does it mean?

A. V-H-F is from 30 to 300 MC and is a type of radio communication which is reliable 24 hours of the day as it is confined to ground waves. Ground waves, as the name implies, travel near the earth's surface. These waves attenuate rapidly and useful V-H-F transmission is limited to approximately 30 miles unless antenna sites at both ends of the circuit are located on high hills. Distance of transmission can be increased greatly by the use of automatic radio relay stations.

Q. Could you tell me what is meant by the term "contact follow" as applied to relay adjustment?

A. When one relay spring contact touches another contact, when the relay is operated or released, depending upon the contact arrangement, it should push or follow the other contact slightly. This push or movement is known as contact follow. This action causes one contact to wipe across the other which has a cleaning action and insures good contact.

Q. What is gopher protected cable?

A. This is a lead covered paper insulated cable protected against gophers by the following coverings:

(1) Asphalt compound.
(2) One layer of impregnated paper.
(3) Asphalt compound.
(4) One layer steel tape.
(5) Asphalt compound.
(6) One or more layers impregnated paper.
(7) Asphalt compound.
(8) One or more layers impregnated jute.
(9) Asphalt compound over each layer of jute.
(10) Coating of whiting.

The steel tape is mild steel having a tensile strength of not less than 40,000 lbs. per square inch. The nominal thickness is 0.010 in. The single layer of steel tape is applied without overlap at any point.

Q. Is it O.K. to connect paper insulated cable direct to the main frame?

A. This is not, in general, considered good practice. However, several installations of this type with which we are familiar have furnished satisfactory service for a long period of time. During the war when it was necessary to conserve critical material, various telephone companies connected paper insulated cable direct to house terminals. The paper then was protected by either a coating of shellac or No. 2 asphalt paint.

Q. Would it be possible to coat a twisted pair drop wire with asphalt and install it underground to eliminate an overhead railway crossing?

A. This could be done; however, it could not be considered a very permanent job. We have information of several installations where ordinary drop wire buried in the ground has provided service for two or three years without trouble. The asphalt covering should add one or two years trouble-free service.

We would recommend either buried wire or cable for an installation of this nature. If this wire is not steel tape armored, a ground wire should be buried with it. This ground wire, or the steel tape armor, should be bonded to the protector ground on each end of the buried section. Protectors with both fuses and open space cut-outs should be provided on each end where the open wire connects to the underground.

Q. We have an open wire line of 12 wires strung on a power line carrying 7,900 volts. What vertical clearance should be maintained between the power and telephone conductors?

A. The Edison Electrical Institute specifications for the construction and maintenance of jointly used wood pole lines carrying supply and communication circuits state as follows:

The minimum vertical spacings between crossarms supporting supply line conductors and crossarms supporting communication line conductors shall be as follows:

	Supply Line 0-7,500	Circuit Voltage over 7,500
Vertical clearance (center to center)	4 ft.	6 ft.

In your case, in order to play safe and provide an adequate margin of safety, the six-foot spacing is recommended.

by MAYME WORKMAN
traffic supervisor
the Illinois Telephone Association
and traffic editor

ON COLLECT calls the called party may request the operator to quote the time and charge when the call is announced, or he may call in at the finish of conversation and request this information.

If this request is made when the call is announced, the operator will tell the called station that she will call after the finish of conversation. She will make the proper entry in the "special instruction" space, attach a cord clip to the toll cord, and, at the first opportunity, will enter the rate on the ticket unless the request is for the time only.

At the finish of conversation, if the called party has hung up, the operator will reach the called station again and quote the charge, saying for example, "On your call from (calling place) the charge is, etc." After quoting the information, if a PBX operator at the called station gives her number or initials, this information is entered in the space for reports. Serial numbers are entered in the "special instruction" space, for example, "ser. (no.)"

If a toll center operator, in answering a recording signal, receives a request for the time and charge on a completed inward collect call, she will write a report ticket and "IN" in capitals in the "special instruction" space, and will encircle "T&C" or "T" or "C" as the case requires. She will secure and enter the calling place and number. If the called station is unable to furnish the number, the operator will ask if he knows the name of the firm or party who called him.

When the operator has obtained the available details, she will say, for example, "I will obtain the charge from (calling place) and call you." The operator will hold the called line, reach the operator at the originating toll center, and say, "Time and charge on collect call from (calling number) or address name, to (called place) (called number)." If the calling number has not been furnished, the operator will say, "Time and charge on collect call to (called place) (called no.) calling number unknown."

The operator always will ask for the time and charge, since the called station may desire both items although he originally requested only one. When the information is received, it is entered on the report ticket. The operator acknowledges by saying "Right" and clears the circuit. After the charge has been quoted, the entry is encircled and the ticket is scratched.

In a case where the charge operator reports that she will have to locate the ticket, saying "LK ticket," the operator will request the charge operator to call her, saying, "Call operator (Tx no.) at (TTC)" and will enter "LK tkt (time)" in the space for reports, and will clear the circuit. At a delayed call position, the operator will file the ticket until the charge operator at the originating toll center reaches her to give a report.

In a case where the charge operator tells the operator that the information has been quoted to the called station, the operator at the TTC will acknowledge saying "Right," will clear the circuit and enter "Quoted by (OTC)" in the space for reports. When this action has been taken, the ticket at the TTC is scratched.

In some offices where traffic is heavy, they locally may be directed to defer obtaining the time or charge when requested at the TTC on an IN collect call. Where such an arrangement is in effect, the operator will explain that it will be necessary to obtain the information from the calling place. She will say, for example, "Because of heavy traffic, I will have to secure the charge later. We will call you (future time)." Then enter "Call (future time)" in the space for reports.

The operator at a delayed call position will secure the information from the charge operator in the originating toll center office when circuits are available or at the time she has been directed locally to do so. At the time agreed, she will reach the party who made the request and give him the desired information.

Questions from Illinois Operators

(1) On collect calls coming into the office, who supplies the time and charge? There has been some disagreement about this.

(2) What entry is made on the ticket when the calling party says he wants to talk to the called party personally and no one else?

(3) Is there a difference in making subsequent attempts on a DA and OD?

(4) When you pass the details of a ticket to another operator, what entry should be made on your ticket?

(5) What phrase is used in requesting MX precedence?

Answers to these traffic questions are presented on page 41.

V V

Open Radio-Telephone Service From Canada to New Zealand

Last of the larger components of the British Empire to be brought within the orbit of overseas radio-telephone connections, New Zealand comes within voice-range of Canada's telephones for the first time.

An announcement of the Bell Telephone Co. of Canada states that the Canada-New Zealand voice-paths will be via telephone land lines to San Francisco and thence by "beamed" wireless direct to the Antipodes.

ENGINEERS DEVELOP USE OF TELEPHONE RADIO LINKS

ALTHOUGH it is many years since telephone companies pioneered in the installation of point-to-point radio links, the war and its attendant defense programs have added impetus to the use of radio in the communication field.

Several installations were completed on both the Atlantic and Pacific coasts in which the radio link formed an integral unit of a very comprehensive and diversified communications network. In some cases additional channels for telephone were made available by the addition of carrier.

The data accumulated from experience in these wartime networks, together with the data on the actual performance of the radio links, now is being studied and applied to the provision of radio links for regular commercial networks.

Several Bell Telephone Laboratories' scientists, with the assistance of Northern Electric Co. engineers, recently completed a survey to be used as a background in the development of future equipments connected with radio link service.

This survey called for more than 3,000 miles of travel through eastern Canada using all types of conveyances from crack trains to stone boats, from

This "road" provides access to one of the stations referred to in the article. It slopes about 45 degrees.

sea level to the top of mountains high enough to harbor snow on the fourth of July, and over roads where new tires lasted not more than 1,000 miles.

The accompanying photographs indicate the very rough nature of the terrain in the approaches and imme-

Visitors never fail to get a thrill from riding in a tractor-powered "stone boat." Engineer is about to hop aboard.

diate vicinity of some radio link stations as at present installed.

A great deal of study still is necessary to balance the requirement of accessibility to radio site against the clear line of sight path desired for very high frequency radio wave propagation. Field strength measurements were made at all points visited in order that the theoretical method of obtaining this data could be checked and substantiated. Transmission levels and noise measurements were noted and a careful study made of the power supply data and the operating troubles encountered during the previous several months of service.

To these studies and on the spot impressions of existing equipment, the radio-telephone link of tomorrow will owe much. Whether it be AM, FM, or micro-wave equipment using pulsetime modulation, whether single or multi-

Where the wind ranges up to 100 miles an hour the antennae equipment must be of sturdy construction.

channel, whether simple point-to-point, or with the added complexities acquired when it is part of the continental wire network, whether used to extend service on a temporary basis, or over natural barriers to wire lines, the job it has to do and the necessity for continuity of service over extended periods without attention are among the prime considerations in determining the kind of radio-telephone equipment necessary.

Another problem is the matter of power supply. When commercial power is available, the power problem is, of course, solved, but very frequently the best location for the radio is one far removed from the source of power. Here, again, some compromise must be reached in favor of the practical solution.

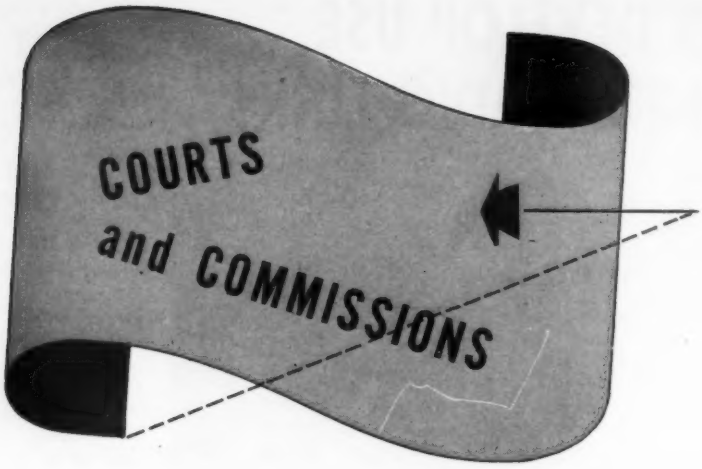
One of the principal technical problems in applying radio channels to telephone service is satisfactory wave propagation, i.e., getting an adequately strong and reliable radio signal from the telephone office to the subscriber, and from the subscriber back to the telephone office.

The frequencies which have been allocated for the various radio-telephone services are largely in the range which operates on a near line-of-sight

The radio shack and power house are connected by a catwalk which protects the men from being blown away.

basis. These frequencies require a fairly uninterrupted path between the transmitter and receiver. Large buildings, hills, mountains, etc., all tend to intercept or cut off the radiated wave travelling from transmitter to receiver.

Recent experiments have shown that the problem of a near line of sight path is now as severe as had first been assumed. However, it can be anticipated that the prospective users of these frequencies will encounter conditions which only can be overcome by the skilful analysis and study by highly trained engineers specialized in the many branches of the several techniques involved.



Commission to Study Rates Of Mountain States T&T

The Public Service Commission of Utah on January 31 expanded its hearings on intrastate toll rates charged by Mountain States Telephone & Telegraph Co., Denver, Colo., to include investigations of the entire rate base structure of the company. (TELEPHONY, August 11, page 20.)

In a concurrent order, the hearings postponed several weeks ago were ordered to resume May 13 at Salt Lake City.

The complaint asking a general investigation of rates, tolls, charges and classifications of the company, which furnishes service in Utah, alleged that the company has been "earning in excess of a reasonable return on a just and proper rate base" and that it has been "granting to some of its patrons preferences and advantages and subjecting others to prejudice and disadvantages."

The earlier hearing involved study of charges for long distance intrastate calls only. The complaint ordering a general investigation will include study of charges made for local telephone service in all classifications.

The complaint, signed by Royal Whitlock, commission secretary, ordered the telephone company to answer within 30 days.

V V

United Telephone Company Purchases Alabama Exchange

The Alabama Public Service Commission February 1 announced approval of the sale of telephone companies at Greenville, Opp and Georgiana, Ala., to the United Telephone Co. (TELEPHONY, January 19, page 38.)

The latter concern operates both in Alabama and in Georgia and recently purchased properties of the Standard Telephone Co. at Dothan.

In the petition approved, the Greenville exchange was offered for sale by G. A. and Georgena Crenshaw; the Opp company by Gus J. and Ruby R. Bryan, and the exchange at Georgiana by D. W. and Emmie D. Eiland.

The proposed purchase was listed in the name of James L. Kirk.

In all three petitions, the commission directed the United company to file inventories of newly acquired property within 90 days.

V V

Plan Mobile Service For Twin Cities

Mobile radio-telephone service in the Twin Cities—Minneapolis and St. Paul—is involved in an application filed by the Northwestern Bell Telephone Co. with the Federal Communications Commission, January 8. The application was for authorization to install an experimental urban radio-telephone station connected to the regular telephone system.

Operation of the new service will not begin until several months after the FCC has authorized construction. This interval is required to permit erection of transmitter-receiver stations and to equip vehicles with radio-telephone sets.

Preliminary surveys indicate that mobile radio-telephone service will be used initially by business concerns or individuals operating vehicles within the Twin Cities, where it is important that they keep in touch with their various drivers, or vice versa. A number of Twin Cities' businesses already have signified their intention of using the service when it becomes available.

Surveys are being made in Des Moines, Iowa, and Omaha, Neb., to ascertain the need for mobile service in those cities. If the surveys indicate that such service would be practical, applications will be made to the FCC.

V V

Hears Bill to Tax Telephone Company's Personal Property

Rhode Island cities and towns would be enabled to tax tangible personal property of the New England Telephone & Telegraph Co. within their boundaries under terms of a bill introduced February 14 in the Rhode Island Legislature.

The proposed measure was introduced by House Democratic Floor Leader William E. McCabe at the request of the Providence city solicitor, along with several other bills designed to permit Providence to tap new revenue sources.

It was estimated that a $2.50 tax on each $100 of the company's tangible personal property, estimated at $10,000,000 in Providence, would yield that city a total of $250,000 annually. The bill was referred to the finance committee.

V V

Vermont Independent Ordered To Raise Capital Stock

Vermont's Public Service Commission issued an order February 14 authorizing the Springfield (Vt.) Local Telephone Co. to increase its authorized capital structure from 800 shares of $100 par value common stock to 2,000 shares, and to issue 400 additional shares to the 800 now outstanding.

Issuance of the order followed a hearing held January 18 in Springfield. Evidence showed that the telephone company must expand its facilities, according to the commission report, and modernize its equipment, including a change to dial operation.

It will cost an estimated $120,000 for the complete plant expansion program, which will be carried out in several steps. Present plans are to finance at least $40,000 through sale of common stock, and the balance of the financing will be decided on later.

The commission found that the issue would allow the applicant to more adequately, economically and efficiently serve its territorial demands and requirements and thereby promote the general good of the state.

V V

Illinois Independents Get Higher Rates

The Illinois Commerce Commission on January 22 authorized the Plymouth (Ill.) Farmers Switchboard Co. and the LaMotte Cooperative Co., Palestine, to advance their rates, effective February 1, as follows:

Plymouth

Class of Service	*Annual Net Rates Present*	*Authorized*
Individual line, business	$18.00	$30.00
Individual line, residence	12.00	18.00
Service stations ..	6.00	7.00

Palestine

Business individual line (Met)	$21.00	$30.00
Business individual line (Gr.)	18.00	30.00
Residence, individual line (Met)...	18.00	21.00
Residence, individual line (Gr.)....	15.00	21.00
Residence, four-party line	12.00	18.00
Residence, individual line (Optional C. B.)	27.00	30.00*

*Proposed schedule limits this service to existing subscribers only in their present location.

Rural, multi-party, business	$15.00	$30.00
Rural, multi-party, residence	9.00	18.00
Extension stations, company-owned..	9.00	10.20
Extension stations, subscriber-owned	6.00	10.20*

*Company to pay subscriber who owns and maintains his telephone $1.60 per year as rental on instrument.

V V

Nebraska Company to File for Rate Increases

Directors of the Nebraska Central Telephone Co., Gibbon, were recently authorized by stockholders to request rate increases from the Nebraska State Railway Commission. An expenditure of $8,000 was also authorized. Of this amount $4,000 will be required for a new switchboard at the Gibbon exchange, to replace one in use since 1907, to which no more additions can be made. The remainder will be used to metallicize rural lines in rural electric areas.

The company operates exchanges at Arcadia, Berwyn, Gibbon and Shelton, with 1,185 stations. The net station gain for 1945 was 109.

V V

Florida Commission to Investigate Complaints

The Florida Railroad Commission on February 11 ordered Florida telephone companies to show at a hearing February 26 why they should not be required to install the "most modernized" equipment throughout their entire plants.

Instructing the companies to be prepared to answer general complaints regarding "inefficient, insufficient and inadequate service," the commission asked for full information on existing telephone difficulties and possibilities of removing them.

Specifically, the commission requested the telephone companies to:

Give reasons for lack of replacements and improvements, together with difficulties encountered with federal rationing authorities.

Cite difficulties in obtaining and retaining experienced workers.

Present a statement of operating expenses and capital investment as compared with revenue.

Give problems resulting from lack of authority to remove obstacles that would cause induction and interference.

Outline difficulties of obtaining franchise extensions and the effect it will have upon company ability to finance installations and modern equipment.

Be prepared to furnish recommendations regarding expansion of urban and rural territories surrounding the individual system.

V V

J. J. Brant Buys Speed, Mo., Company

J. J. Brant, district manager of the United Telephone Co., Kansas City, Mo., recently purchased the Speed (Mo.) Telephone Co. from J. D. Donahoe and sons, G. L. Donahoe of El Dorado Springs and Leslie Donahoe of Kansas City.

Mr. Brant will continue his duties as manager for the United company.

V V

Summary of Commission Rulings and Hearings

Federal Communications Commission

January 21: Granted Mountain States Telephone & Telegraph Co., Salt Lake City, Utah, construction permits for Class 2 experimental station and one portable-mobile station with two units; same applicant, Denver, Colo., Class 2 experimental station and one portable-mobile station with five units; Ohio Bell Telephone Co., Columbus, Class 2 experimental station and one portable-mobile station with 37 units.

January 29: Granted Pacific Telephone & Telegraph Co., Southern California Telephone Co. and Bell Telephone Co. of Nevada authority to supplement existing facilities between Oakland and Sacramento, Calif., and other points. Estimated cost, $1,630,400.

February 4: Granted Southwestern Bell Telephone Co., Oklahoma City, Okla., construction permits for Class 2 experimental station and one portable-mobile station with 75 units to operate on experimental basis.

February 5: Granted American Telephone & Telegraph Co. authority to reduce rates for overseas message toll service between Italy and certain states in U. S.

February 6: Granted American Telephone & Telegraph Co., Lawrenceville, N. J., three months' authority to point-to-point radio-telephone station, using regularly licensed equipment, frequencies, power and emission to communicate with Norwegian government at Oslo.

February 6: Granted American Telephone & Telegraph Co. and Illinois Bell Telephone Co. authority to supplement existing facilities between Chicago, Ill., and Minneapolis, Minn., and other points. Estimated cost, $1,050,000.

February 7: Granted American Telephone & Telegraph Co. authority to establish rates for overseas message toll service and channels for program transmission between U. S. and Norway.

February 8: Granted American Telephone & Telegraph Co. permission to reduce rates for overseas message toll service between Switzerland and certain states in U. S.

Illinois Commerce Commission

February 19: Hearing on application of National Trail Telephone Co., Altamont, for authority to issue $6,000 additional first mortgage 4½ per cent Series A bonds.

Kansas Corporation Commission

February 19: Hearing on application of C. A. Sweet, doing business as Greenleaf (Kan.) Telephone Co. for permission to transfer franchise and cease operating.

February 19: Hearing on application of Greenleaf Telephone Co. for certificate of convenience and authority to transact telephone business.

March 4: Hearing on application of Esbon Telephone Co. and Peoples Telephone Co. for permission to cease operating free lines at Esbon and Lebanon.

March 4: Hearing on application of L. J. and Winona Wilson for authority to make rate changes at Geuda Springs.

Minnesota Railroad & Warehouse Commission

February 25: Hearing on application of City & Farmers Telephone Co., Rushford, for authority to raise rates.

February 27: Hearing on application of McLeod County Telephone Co. for authority to raise rates and install dial service at Buffalo Lake.

Oklahoma Corporation Commission

April 1: Hearing continued on application of Fred Barrett to require Oklahoma Automatic Telephone Co. to restore and improve service at Clarita.

BEDSIDE SERVICE PROVIDED FOR WOUNDED VETS IN HOSPITAL

Bedside telephone service, recently installed in the Navy Hospital in Long Beach, Calif., by the Associated Telephone Co., Ltd., was one more step in providing everything possible at this rehabilitation center for the comfort of its patients.

This service was installed for the benefit of bed patients who heretofore had been denied direct communication service with their homes. Now a bed patient who wishes to place a long distance call needs merely to tell his ward nurse. She provides him with an "Appointment to Place Telephone Call" card, on which he furnishes information as to his name, ward and sack numbers, name of person he wishes to call, the date and approximate time. The card is picked up by the roving attendant who, at the appointed time, completes arrangements for the call, places a portable telephone by the bedside and gives the patient the go-ahead signal.

This service is tied into a switchboard installed in the basement of the hospital, known as the telephone center, and is operated by telephone company personnel independently of the hospital's main telephone set-up. The telephone center (right photo) is a popular place with patients not confined to their beds. Both local and toll calls can be placed from six newly installed booths.

"Teach-A-Phone" System Provides School for Girl

Chances for an education looked pretty slim to Martha Jean Meier, 17, Ottumwa, Iowa, when she was stricken with arthritis seven years ago. But while she has not been in a schoolroom since then, she has attended classes regularly for the past three years and was graduated from the eighth grade with honors in 1943.

The "teach-a-phone," a two-way communication system which operates over leased telephone wires, has made it possible for Martha Jean to keep up with her studies, although she lives on a farm 7½ miles from town.

Iowa's department of education turned to this device, which permits talking or listening from either end of the line, and adapted it to school use while hunting for ways to bring daily instruction to shut-ins. So far, 87 "teach-a-phones" are in use throughout Iowa at little expense to pupils or parents. A state appropriation covers most of the cost.

Equipped with hand or foot controls, whichever the handicapped youngsters can use better, the "teach-a-phone" enables them to listen quietly to routine classroom discussions, or break in to ask questions or give answers as they see fit.

School officials readily admit the "teach-a-phones" have their limitations. For example, laboratory work is hard to explain over the telephone. But for the attentive, responsive pupils like Martha Jean, it has worked wonders. In addition to helping them keep up with their classwork, it makes recovery easier by taking their minds off their ailments.

V V

B. B. Strieby Will Return To Odebolt, Iowa, Company

B. B. Strieby will return to the Sac County Mutual Telephone Co., Odebolt, Iowa, on March 1 as manager, George Kessler, president of the board of directors, recently announced.

Mr. Strieby recently sold his telephone exchange at Longton, Kan., but will remain there until March 1. He had been with the Sac County company for 21 years when he moved to Longton in November, 1944.

V V

Book Review

For anyone in the telephone industry planning to take first or second class Federal Communications Commission radio operators' license examinations, two newly published books, *Practical Radio Communication* and *Radio Operating Questions and Answers* by Nilson and Hornung, make excellent study text.

Practical Radio Communication presents in 927 pages a complete instruction course and reference guide in radio station operation written to provide its readers with a working knowledge of radio-operating principles and practice. In four parts—Radio Principles, Aviation Radio, Broadcasting and Marine Radio — the book covers the principles, radio equipment and power apparatus for the three branches including very high and ultra-high frequencies and frequency modulation, and requirements of all classes of FCC radio operator license examinations.

Copies of *Practical Radio Communication* can be ordered through TELEPHONY for $6.00.

Radio Operating Questions and Answers is a 400-page technical review book on radio communications for prospective and experienced radio operators of all classes, especially those about to take FCC first or second class radio operator license examinations. It condenses in question and answer form theory, apparatus, circuits, operation laws, regulations, etc. The book makes an excellent study text as it gives the answers to all possible questions and provides all the information covered in the new form of government examinations.

Copies of *Radio Operating Questions and Answers* may be obtained direct from TELEPHONY for $3.00.

ABC of the Telephone

(Continued from page 27)

function of the dial is to generate pulses in the line circuit. These pulses are caused by a set of contacts which open and close when the dial is in operation. The external parts of dials built by various manufacturers are practically identical, the only variations being in the mechanical details of design.

To provide automatic return to normal when the dial wheel is rotated, a spring is attached to the main shaft. When not in use, the spring tends to hold the dial wheel in its normal position. Turning the finger wheel, winds up the spring to provide the necessary force to return the dial to normal when the finger wheel is released. The dial mechanism is arranged to open and close the impulse springs only as the dial returns to normal.

(To Be Continued)

V V

New Exchange Building For West Plains, Mo.

F. M. Brown, general manager of the Western Light & Telephone Co., has announced that the company has awarded a contract for erection of the new telephone building in West Plains, Mo.

A new switchboard and other necessary equipment have been ordered and are scheduled for delivery about the first of May. In designing the building and equipment, provision has been made for growth up to double the present size, for the city of 8,000 population.

Plans are now being drawn for extending the outside cable system to provide service to the new shoe factory area and other sections of town where cable capacity is not sufficient to handle the orders for service. The estimated cost of all work now in progress and planned for 1946 to improve and extend the telephone system in West Plains is $65,000.

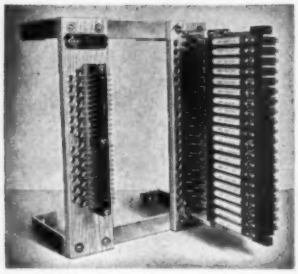
V V

W. H. Harrison Wins Award

MAJ. GEN. W. H. HARRISON, vice president of the American Telephone & Telegraph Co., was awarded the Hoover Medal for scientific public service during 1945 at the winter convention of the American Institute of Electrical Engineers.

STROMBERG-CARLSON RECOMMENDS...

THE COOK L9



WALL DISTRIBUTING FRAME

The Type L9 Wall Distributing Frame is intended for economical distribution and protection of limited capacity cable, and especially for installation in small exchanges. The L9 Wall Distributing Frame, made in 20, 40, 60, 80, and 100 pair sizes is designed to carry any Cook central office protector. The frame of the L9 consists of two pieces of hard, kiln-dried maple—one drilled and arranged for, and equipped with, line terminals; the other drilled and milled for mounting the protectors; and two heavy mounting brackets of bar iron finished in durable paint.

Crapo HIGH-TENSILE LINE WIRE

For Long-Span Low-Cost Lines

Construction costs are reduced to a new low level, maintenance expense is minimized, wherever **Crapo** HTL-85 and **Crapo** HTL-135 High-tensile, Low-resistance Line Wires are used. These revolutionary wires, with their superior strength, make possible rural lines with span lengths one and one-half to two and one-half times greater than were practical heretofore.

Crapo HTL-85 permits spans to 225 feet in heavy, 325 feet in medium, and 375 feet in light loading districts; provides stronger spans on existing pole structures.

Crapo HTL-135 makes possible spans of from 350 feet in heavy to 500 feet in light loading districts. Both wires possess superior telephonic transmission qualities.

STROMBERG-CARLSON COMPANY

Factory and General Offices: Rochester 3, New York, U.S.A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto

COMING CONVENTIONS

Texas Telephone Association, Adolphus Hotel, Dallas, March 11 and 12.

Tennessee Independent Telephone Association, Andrew Jackson Hotel, Nashville, April 2.

Kentucky Independent Telephone Association, April 4 and 5. No hotel named as yet.

Nebraska Telephone Association, Paxton Hotel, Omaha, April 9 and 10.

Iowa Independent Telephone Association, Ft. Des Moines Hotel, Des Moines, April 11 and 12.

United States Independent Telephone Association Executives' Conference, Edgewater Beach Hotel, Chicago, April 16 and 17.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 23 and 24.

Indiana Telephone Association, Severin Hotel, Indianapolis, May 1 and 2.

Illinois Telephone Association, Pere Marquette Hotel, Peoria, May 8 and 9.

Wisconsin Independent Telephone Association, Park Hotel, Madison, May 14, 15 and 16.

New York State Telephone Association, Hotel Onondaga, Syracuse, May 22 and 23.

Pennsylvania Independent Telephone Association, Lawrence Hotel, Erie, June 4, 5 and 6.

Oregon Independent Telephone Association and Washington Independent Telephone Association, Hood River, Ore., June 13, 14 and 15. No hotel named as yet.

Michigan Independent Telephone Association, September 18 and 19. Hotel Olds, Lansing.

United States Independent Telephone Association, Stevens Hotel, Chicago, October 14, 15 and 16.

North Carolina Independent Telephone Association, Pine Needles Hotel, Southern Pines, November 11 and 12.

Alabama Independent Telephone Association, Jefferson-Davis Hotel, Montgomery, November 18 and 19.

Sherlock never saw the time he could find so many things as with this

New Stewart

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Combined

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COMBINES all the new advantages listed to left, with universally used Stewart Cable Tester for locating shorts, crosses, grounds, wet spots, etc. NOW YOU CAN FIND WHERE ANY CABLE OR PIPE IS BURIED, AND EXACT DEPTH. Light, handy, accurate, rugged. Needed by every utility, public or private light, power, water or telephone service —every industry. Mail coupon below, or use your letterhead for full descriptive bulletin.

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Send Bulletin on CABLE TESTER & LOCATOR

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Television Carries Washington Lincoln Day Ceremonies

The first television broadcast between Washington, D. C., and New York, N. Y., was made February 12 when the Lincoln Day ceremonies in Washington, D. C., were carried over American Telephone & Telegraph Co. coaxial cable between the two cities. The 225-mile cable was jointly used by the National Broadcasting Co., the Columbia Broadcasting System and the Allen B. DuMont Laboratories.

Television cameras, placed on the steps of the Capitol, and both inside and outside the Lincoln Memorial, brought the television audience interviews with Paul Porter, chairman of the Federal Communications Commission; Senators Kenneth McKellar, Burton K. Wheeler, Wallace H. White and Representative Sam Rayburn, Speaker of the House. The cameras also recorded Gen. Dwight D. Eisenhower's arrival at the shrine and his placing of the wreath at the foot of the statue.

V V

Northwestern Bell Reports Progress of Rural Service Plan

Officials of the Northwestern Bell Telephone Co. report that substantial progress has been made in carrying out the program of extending and improving rural service in the five states in which it operates. In the last five years, in spite of war and reconversion conditions, the company has added over 19,000 rural telephones in those states. In Nebraska the gain has been 2,770, an increase of 64 per cent as compared with the entire area. In much of the territory rural telephone development has been the highest in the United States.

A year ago it was estimated service was available to about 80 per cent of all rural families over existing pole lines, but since then lines have been extended in both Iowa and Nebraska to serve a larger number. It is proposed to substitute dial service in a number of communities that still use magneto telephones, and otherwise to modernize the service, one improvement being to cut down the average number of telephones on rural lines.

V V

Rural Growth In New York

More than 8,100 new telephones serving farmers and other rural residents were added by the New York Telephone Co. during 1945, it was recently announced. This is the greatest rural growth for any year and brings the company's total telephones in rural areas in New York state to 110,000.

SUCCESS STORY

- Each installation saves $30 to $90 a year.
- Trouble and expense of routine battery inspection eliminated.
- Wires carrying charging current to subscriber PBX boards are released for revenue-producing service.
- Long life—outlasting many sets of batteries.

Here's how large independent telephone companies have benefited in 9 years experience with Raytheon Rectifilters.

Raytheon RECTIFILTERS

(BATTERY-ELIMINATORS FOR TELEPHONE SERVICE)

No batteries. Low maintenance. Long life. That's the nutshell story of the Raytheon Rectifilter.

It's a success story that goes back more than nine years. A story of *proved* dependability, *proved* economy of operation, *proved* engineering excellence.

Essentially, the Rectifilter is a dry plate rectifier with associated components and a Raytheon control unit. It provides a time-tested means of supplying continuous stabilized DC voltage direct from AC. It is magnetic and automatic, requiring no adjustment, low maintenance.

Bulletin DL 48-156H gives you the rest of the story. Send for it today.

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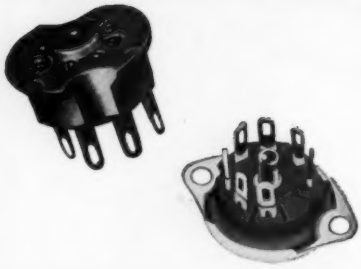
Excellence in Electronics

THE VIBRATION-PROOF SHOCK-PROOF

EBY MINIATURE TUBE SOCKET



The ideal miniature socket for

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Now available for commercial use — the famous Eby miniature tube socket, the only socket meeting specification JAN-5-28 for military aircraft use.

Developed to meet the most rigorous service conditions of constant vibration and shock, the peace-time applications of this socket are readily apparent.

The use of the Eby miniature tube socket with special beryllium copper contacts assures minimum tube breakage and maximum uninterrupted operation of equipment.

Can be supplied with shock shield and protective cover or saddle type.

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HUGH H. EBY INCORPORATED
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VETERANS WANT TELEPHONE WORK

IN AN effort to be of assistance to returning veterans, as well as to telephone companies which have a manpower shortage, we expressed to the Office of the Chief Signal Officer of the Army our willingness to publish the names and addresses of Signal Corps men who desire to enter telephone work. The Chief Signal Officer accepted our offer and advertisements were run in the post papers of Fort Monmouth, N. J., and Camp Crowder, Mo., announcing our plan. To date we have received letters from the following Signal Corps men, asking that they be listed. It is suggested that any telephone operating or manufacturing company desiring men with their qualifications write them immediately. (Previous names were published in the November 3 and 17, December 1, 15 and 29, January 5 and February 9 issues.)

* * *

FRANK I. NOBREGA, 871 FOX ST., BRONX 59, NEW YORK CITY. Civilian employe in telephone department at Pearl Harbor, installing equipment and trouble shooting. Will return to New York in April. Switchboard operator experience.

* * *

T/S JAMES R. CAMPBELL, 16618 UNION TURNPIKE, FLUSHING, LONG ISLAND, N. Y. Thirty-four months overseas with Signal Intelligence Service. Was in charge of 50 radio operators as traffic analyst. Prefers work with manufacturer.

* * *

HAROLD E. NIELSEN, 1216 CHATHAM ST., RACINE, WIS. Over three years with Signal Corps, is now in Air Corps. Expects discharge end of February. Radar repairman and has attended army school and American Television Laboratories, Chicago. Wants work with operating company.

* * *

SGT. MARVIN L. JENSEN, HQ. DET. ASF, PRD, CAMP BEALE, CALIF. Thirty-nine months' experience in Signal Corps mostly as cryptographic technician; teletype operator and general clerical duties. Wants work with operating company in Nebraska. Expects discharge February 20.

* * *

DORSEY F. BARTOS, 2716 TROOST AVE., KANSAS CITY 3, MO. Forty months' Signal Corps service. Was member of line crew, assisted with laying, stringing and repairing of military communications lines. Wants work with telephone company.

* * *

CORP. GEORGE GAIECK, 1118 S. 47th ST., MILWAUKEE, WIS. Expects to be discharged soon. Has 2½ years' radar and one-half year teletype maintenance experience.

DANIEL J. GOFFREDO, 20th BOMB SQ., 2nd BOMB GP, APO 534, C/O PM, NEW YORK, N. Y. Army Signal Corps experience in messenger center section. Expects discharge in a few months. Lives in Philadelphia; prefers work in Pennsylvania with operating company.

* * *

S/SGT. ELMER SETZKORN, 3874 THIRD AVE., SACRAMENTO, CALIF. Nine months of radio schooling while a reserve in Army. Studied airborne radar at army schools and received diploma. Studied complete business course including bookkeeping. Age, 29; married. Expects discharge in April. Prefers work with operating company.

* * *

S/SGT. EDWARD KUBIS, 1927 SIGNAL CO., APO 180, C/O P. M. SAN FRANCISCO, CALIF. Is in Army Signal Corps attached to signal center at Okinawa air depot. Expects discharge in March. Has worked as teletype maintenance man for past 31 months, mostly on permanent installations. Prefers operating company.

* * *

E. A. CANO, P. O. BOX NO. 2, MESILLA, NEW MEXICO. In Navy for two years. Trained in sound school, later worked with sound powered telephones and other communications equipment. Prefers operating company.

* * *

JACK D. WRIGHT, 1726 S. 15TH, LAWRENCEVILLE, ILL. Wants employment as teletype installer or teletype repairman with operating company. 3½ years' experience in Marine Corps in that work, also four years as telephone lineman.

Lincoln T&T Announces Organization Changes

The Lincoln (Neb.) Telephone & Telegraph Co., recently announced two organization changes: The appointment of B. I. Noble as assistant to the vice president and general manager, and the appointment of Merle M. Hale as general commercial superintendent.

In his new position, Mr. Noble's main responsibility will be the active direction of the company's policies and activities in respect to public relations.

B. I. NOBLE

The assignment will be on a company-wide basis and will include supervision of public relations matters pertaining to the 121 exchanges served by the company in the southeastern 22 counties of the state.

Mr. Noble returned on December 24 from a term of duty overseas with the Army Signal Corps where he held the commission of lieutenant colonel. Assigned as the plans officer for the signal section at the headquarters of General Omar Bradley's 12th Army Group he served in England, France, Luxembourg and Germany from May, 1944, to August, 1945. When the 12th Army group was dissolved he acted as executive officer with the Theater Signal Communication Service at Wiesbaden, Germany. Entering the army on direct commission as first lieutenant in August, 1942, he served as base signal officer at Maxwell Field, Ala.; Tyndall Field, Fla., and Newport Army Air Field, Ark. He holds the Bronze Star for meritorious service with the 12th Army Group.

Well known for his interest in civic and community affairs in Lincoln and York, Mr. Noble was elected president of the Lincoln Junior Chamber of Commerce in 1937 and served as national director of the United States Junior

M. M. HALE

Chamber of Commerce in 1939-40. He was the recipient in 1937 of the Distinguished Service Award presented by the Lincoln Junior Chamber of Commerce each year to the young man most outstanding in his services to the community. Active also in welfare organizations, he is a past-director of the Community Chest and former member of the advisory board of the Salvation Army. During his residence in York from 1939 to 1942 he was a director of the Rotary Club and director of the Chamber of Commerce, and engaged actively in the community's civic and welfare program.

Mr. Noble's career during his 15 years in the telephone business has been distinguished by his ability and industry. His term of executive service with the Army Signal Corps further qualifies him for the duties and responsibilities of his new position. Beginning his employment in 1927 as a groundman in the Lincoln plant department, he was made plant statistician in 1930 and in February, 1934, was promoted to the position of sales supervisor on the staff of the general commercial superintendent. In August, 1939 he was made area manager at York, holding this title until his entry into the Army in August, 1942.

Mr. Noble spent his first years in Thermopolis, Wyo., moving to Lincoln in 1923 where he attended the University of Nebraska and was affiliated with Alpha Sigma Phi fraternity.

Mr. Hale was named acting general commercial superintendent in January, 1945, and has held this title since that time. In his present capacity he will continue the direction of commercial operations of the company.

Entering the company in 1925, Mr. Hale held the positions of directory and methods supervisor, and commercial en-

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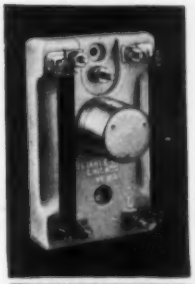
Protective Equipment

No. 955 One-piece, Substation protector, with low absorption porcelain base. Eliminates need for asbestos mats.



No. 1000 Outdoor Protector with fuses and air gaps for protection against static and crosses with electric circuits. Weatherproof cover.

"R.U." reversible unprotected Cable Terminal provides exceptional convenience in installation and long, dependable service.

"Reliable" B-27 Cable Terminal. Available in three types for standard cable terminal fuses. Detachable mounting bracket permits one-man installation.

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ENGINEERS WANTED

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The Federal Telephone & Radio Corp.

Offer opportunities with unlimited possibilities to engineers familiar with dial telephone systems of any type

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Circuit Engineers
Apparatus Design Engineers
Sales Engineers
Inspectors Installers
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Our rapidly expanding domestic and foreign markets are creating rare opportunities for aggressive, qualified men.

★

Write to Manager

Switching System Division

FEDERAL TELEPHONE & RADIO CORP.
360 Thomas Street
Newark, N. J.

gineer before his appointment as superintendent. He holds a BS degree from the University of Nebraska and is a past master of Lancaster Lodge No. 54 AF&AM. He is a member of the Lincoln Chamber of Commerce and Kiwanis and has long been active in civic and welfare organizations. He is a past president of the Frank H. Woods Chapter of the Independent Pioneer Telephone Association.

V V

Service Committee Letter Discusses Toll Line Signals

"Prompt Answers to Inward Toll Line Signals" was the subject selected by the Indiana Telephone Association Service Committee for its February letter. The committee's March letter is expected to deal with important plant matters, with subsequent letters taking up specific traffic problems.

The service committee was organized to prepare material concerning service problems which beset Indiana companies in connection with reconversion and postwar adjustments. (TELEPHONY, December 15, page 33.) Three hundred and thirty-five companies and individuals now are receiving the special service committee letters, and the committee is in a position to render special aid in specific individual cases. Working closely with the service director of the Indiana Public Service Commission, it attempts to assist in handling service complaints brought to the commission's attention.

The committee is expected to play an important part in the association's annual convention on May 1 and 2.

V V

G. B. Foscue, Jr., Resigns Post with Iowa Company

G. B. Foscue, Jr., recently announced his resignation as general superintendent of the Iowa Telephone & Telegraph Co., Dyersville, Iowa, which position he had held for several months. While he has not made definite plans, Mr. Foscue states that he intends to remain in the telephone industry.

He entered the telephone operating business in July, 1935, following graduation from Lehigh University, when he was employed by the Gary Group, becoming associated with Telephone Services Inc., Fort Wayne, Ind. Later on he entered the commercial department of the Home Telephone & Telegraph Co., Fort Wayne.

In September, 1935, Mr. Foscue was transferred to Kansas City, Mo., where he served as secretary-treasurer of the following telephone operating companies in which position he handled corporate matters: Blue Mountain Telephone & Telegraph Co., Bangor, Pa.; Community Telephone Co. of Wisconsin, Black River Falls; Minnesota Community Telephone Co., Waterville; Ohio Community Telephone Co., Cadiz; Wiconisco Telephone & Telegraph Co., Elizabethville, Pa.; Southern Telephone & Telegraph Co., Quarryville, Pa., and Illinois Central Telephone Co., Clinton, Ill.

G. B. FOSCUE, JR.

He also held offices in the Point Roberts & Gulf Telephone Co. and the St. Croix Valley Telephone Co., St. Croix Falls, Wis.

In February, 1939, Mr. Foscue became associated with the Texas Telephone Co., Sherman, which operates 20 exchanges in Texas, as assistant general manager and director. In this position he had charge of the traffic department and had supervision over other important activities of the Texas company such as insurance and tax matters and personnel relations.

While in Sherman, Mr. Foscue was active in civic affairs, serving in official positions in the Lions Club and being active in the affairs of such organizations as the Red Cross, Salvation Army, Community Chest, Boy Scouts and Infantile Paralysis Association.

In July, 1945, he became general superintendent of the Iowa Telephone & Telegraph Co.

V V

Weather Outvies Time

Seemingly, it is more important to know what the weather is than to know what the time is in Chicago, since the records of these two services of the Illinois Bell Telephone Co. show that 12,000,000 people a year call for weather reports and about 11,000,000 call for the time.

Here Are Resolutions for Telephone Courtesy

Many New Year's resolutions already are merely memories, but the following rules of telephone courtesy, presented by F. Chamberlain in the *Board of Trade Journal* might be beneficially used by Independent companies as material for bill enclosures or in their advertising:

(1) Every telephone call in or out of your office makes an impression—good or bad — on the person at the other end of the line.

(2) An organization or a person is often judged by the quality of the voice and the manner of approach used over the telephone.

(3) Rather than asking "Who's speaking, please?" use the technique, "May I tell Mr. Smith who is calling?"

(4) Your office staff should be instructed never to call any person unless the party calling is ready to speak on the telephone.

(5) If a call comes for Mr. Smith and you do not know if he is readily available, it is better to take the number and have Mr. Smith call it, than to make the caller hold on to a vacant telephone.

(6) Telephones are made to convey messages from party to party. They are not designed for social chatter. Get your message over and leave the telephone for others to use.

(7) Don't shout on the telephone. Speak in a clear voice, your mouth within one inch from the mouthpiece.

(8) You will find a voice sounds much more pleasant if it has a little smile going out with it. When you answer the telephone, do you sound as if you are glad the party telephoned?

(9) It is well to answer your telephone with the name of your firm, organization or person answering, so that the caller need not say, "Who is speaking?"

(10) If somebody calls your office and asks for Mr. Smith and he is not in, it is good service to say, "May I take a message for him, please?"

(11) When you telephone someone, don't take it for granted he knows who is speaking, but introduce yourself at once.

Answers to Traffic Questions On Page 30

(1) The answer to your question is contained in the preface.

(2) If the calling party wishes to talk only to the person specified, enter "only" following the name of the called party.

(3) The same intervals are used in making a subsequent attempt following a report of OD or DA.

(4) Enter "psd (time)" on the ticket.

(5) Say, "MX precedence. This is (OTC)."

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On many standard items, delivery from our near-by warehouse saves time. Call our nearest office. *Graybar Electric Company, Graybar Building, New York 17, N. Y.*

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SUB-CYCLE IS MADE IN 6 MODELS AND IS BUILT FOR HEAVY DUTY.

WELL, YOU CAN BE SURE THERE'S:

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And On The Other Hand There Are *All* The Features That Assure A POWERFUL, ECONOMICAL, QUIET RINGING SUPPLY.

ALSO PULSATORS
Sold By Leading Distributors

LORAIN PRODUCTS CORPORATION
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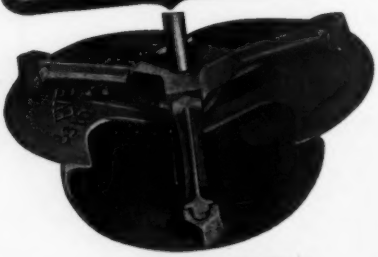

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The exclusive Everstick nut housing locks the Anchor firmly on the rod. This speeds up installation. Plates are so designed, that they expand easily into undisturbed earth, and extra holding power is achieved. Made of tough, rust-resistant malleable iron. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

WITH THE MANUFACTURERS

Kennecott Appoints E. S. Rising General Sales Manager

The Kennecott Wire & Cable Co., Phillipsdale, R. I., have announced the appointment of E. S. Rising as general sales manager, succeeding E. H. Hammond upon his retirement on January 1.

Mr. Rising joined the Kennecott company January 1, 1943, as assistant general sales manager. Prior to that time he had gained valuable experience in the field with the Hungerford Brass & Copper Co. with whom he started in 1925. When the Hungerford company was purchased by the Chase Brass & Copper Co., in 1927, Mr. Rising remained with the new organization in a sales capacity handling several brass products until approximately 1936. At that time he took over the sales of plumbing, heating and roofing materials in the New York territory.

V V

Stromberg-Carlson Announces Engineering Division Changes

A realignment of certain positions in the engineering and research division of the Stromberg-Carlson Co., Rochester, N. Y., was put into effect last month, it has been announced by Frederic C. Young, vice-president in charge of engineering and research. The realignment was made necessary by the rapid rate of the company's over-all expansion, Mr. Young disclosed.

R. T. FURR

Under the changes, Roger T. Furr was named chief technical service engineer in charge of the drafting and

H. H. BRAUER

blueprint sections, the physical testing laboratory, the model shop, the standards and properties section and the engineering procurement section. The instrument laboratory became a part of the research department under the direction of Benjamin Olney, director of research, while Howard H. Brauer, formerly in charge of the instrument laboratory, joined the company's engineering staff organization, assuming charge of the business phases of the division, including budgeting and scheduling. Oliver L. Angevine, Jr., was appointed chief sound equipment engineer in charge of the engineering department of the company's fast-growing sound equipment division.

Mr. Furr's experience with the company began in January, 1944, when he was employed to head the radio drafting and blueprint department as engineer-in-charge. A native of Washington, D. C., he graduated as a mechanical engineer from George Washington University, class of 1929. From 1929 to 1941, he held the positions of field engineer and supervising engineer for the Booth & Flinn Co. During the years 1930-1931, he was resident engineer supervising the construction of Rochester's Veterans' Memorial Bridge. Early in 1941, he joined the U. S. Army Engineers in a civilian engineering capacity, in British Guiana. He was later made general superintendent of construction of the army air base there.

A native of Cincinnati, Ohio, Mr. Brauer was graduated from the University of Cincinnati with an electrical engineer's degree in 1937. After graduate study at the University of Chicago, he entered his chosen field of

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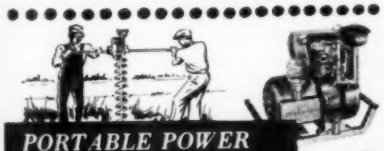
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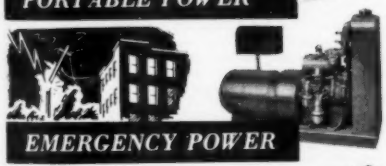
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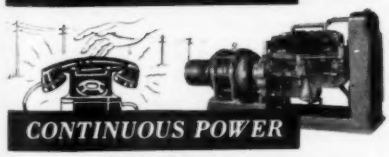
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O. L. ANGEVINE, JR.

electrical engineering. Firms in which he has held responsible engineering positions prior to his association with the Stromberg-Carlson Co. include: Trimm, Inc., Chicago, Ill., Shure Brothers, Chicago, Ill., and the Crosley Corp., Cincinnati, Ohio. He was named to the post of development engineer in the Stromberg-Carlson instrument laboratory in July, 1941, becoming engineer-in-charge September, 1944. He is a member of the Rochester Academy of Science, the American Institute of Electrical Engineers, and that organization's national instruments and measurements committee, the Institute of Radio Engineers, the Acoustical Society of America, Eta Kappa Nu and Tau Beta Pi, the national honorary engineering societies, and the Royal Astronomical Society of Canada.

Mr. Angevine, a native of Rochester, attended the Massachusetts Institute of Technology. His service with Stromberg-Carlson began shortly after his graduation in 1936 with the degree of bachelor of science in electrical engineering. Starting in the telephone laboratory, Mr. Angevine had advanced by 1941 to the post of staff engineer assisting the vice president in charge of engineering and research in problems involving planning and organization. He is chairman of the committee on sound systems of the engineering department of the Radio Manufacturers' Association, past chairman and the present executive committee member of the Rochester section of the Institute of Radio Engineers, past chairman and present executive committeeman of the Rochester section of the American Institute of Electrical Engineers, and a member of the Rochester Engineering Society, the Technology Club of Rochester, and the Phi Delta Theta.

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Indicates hot or grounded wires. Tells AC from DC. Far superior to ordinary clumsy test bulb. Indispensable in shop or home. The only pocket-size tester with PATENTED SAFETY FEATURE.

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for harmonic or coded bells. Dual purpose device which economically improves both ringing and transmission on party lines. NO MOVING PARTS. Fully guaranteed. Can be installed in a minute.

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Illinois Bell to Expand at Hammond and Calumet City

The Illinois Bell Telephone Co. has announced that it will spend $261,000 during 1946 to improve and expand the telephone system in Hammond, Ind., and Calumet City, Ill. This expansion program is designed, (1) to give service to the 1,467 area residents who have been waiting for it, and (2) to provide telephone users with the most modern and efficient telephone system possible.

About $76,000 will be spent for switchboards and other central office equipment. About $185,000 will be spent for underground and aerial cable.

Also, during the year the company hopes to hire at least 50 more operators to handle the increased number of customers and to speed the increasing volume of calls. Before the war, 117 operators were needed to handle the 10,750 calls a day going through the Hammond exchange. Now there are 250 operators on duty there, putting through an average of 17,200 calls a day. With the increasing number of calls, a total of at least 302 operators is needed.

The projects planned for Hammond are part of Illinois Bell's postwar construction program, estimated to cost about $248,000,000 and scheduled to take five years for completion. Other phases of the program include faster toll service, with operator toll dialing; mobile telephone service to and from moving vehicles; a network of coaxial cable which will provide more channels for long distance service, and more and better service for rural subscribers.

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Kellogg No. 22 L. or C. Trans. Complete with back $1.35 Less back @	1.25
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FOR SALE: Small exchange. Residence type building with living quarters. Good expansion prospects. Ill health reason for selling. Write direct to Box 96, Jackson, Nebraska.

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FOR SALE — IMMEDIATE DELIVERY: **NEW TWISTED PAIR NO. 17 BRONZE DROP WIRE.** Discounts in quantity. Write Telephone Repair & Supply Co., Rogers Park Station, Chicago, Ill.

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